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ABSTRACT

This book was developed in response to the concern for energy conservation. It contains activities that stress an energy conservation ethic and includes many values clarification activities for grades K-2. The teacher is provided with some background information on energy, an extensive teacher's annotated bibliography, and a list of resources. The topic of energy is divided into concepts and objectives, with activities interspersed where appropriate. There are over 40 pages of ditto and transparency masters, two posters, and a game for the teacher's use. Also included is an evaluation sheet for the teacher to assess the activity packet. (MA)

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ENERGY

Conservation Activity Packet

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K–2

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NOTE TO SCHOOLS AND TEACHERS

The filmstrips referred to in the 5th and 6th grade sets can be borrowed from your local AEA. The AEA's have five (5) sets of the filmstrips available. You may wish to make arrangements with them for purchasing a copy of these filmstrips for your own building. The cost was prohibitive for us to include the filmstrips in each packet.

Thank you for your understanding.

ENERGY CONSERVATION ACTIVITY PACKETS

Ruth Bakke
project writer/coordinator

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Southeast School
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INTRODUCTION TO ENERGY PACKETS

The energy shortages and emergencies with which we are faced attest the treatment humans have given to their natural surroundings. Not only do we experience personal inconveniences but we also see severe economic and environmental consequences. Our nation has arrived at a time when it needs to reevaluate where it is going, at what speed, and how it will eventually arrive at that goal. The National Academy of Sciences generally agrees that the reserves and resources of domestic oil, gas and coal will satisfy energy needs in the United States until the year 2000. Presently the United States doubles its energy consumption every 13 years. In 1975, electric companies burned 507 million barrels of oil to generate electricity, 500 million barrels were burned to heat factories. Much of the oil and natural gas consumed could be replaced by coal, thus drastically reducing oil imports.

The instructional program in a school can examine this energy situation with reason and logic. When a social issue is integrated into the total curriculum, it helps children to apply what they are learning. The educational process can help students become aware of the alternatives and consequences in regard to energy, then guide them to choose a value. Students can learn that it is just as exciting to make something last as it is to develop something new.

Through use of the enclosed materials and activities, it is our intent to stress a conservation ethic. The conservation ethic means more than turning lights off, it has wider implications such as developing new industries to recycle metals, making more durable products, and prioritizing fuel uses.

Our values show what we tend to do with our limited time and energy. They are related to the experiences that shape them. In order to help children develop clearer values, teachers must help them use the process of valuing. Students become much more purposeful when they have been given opportunities to clarify their values.

Each packet contains values clarification exercises designed to carry out the stated objectives. The teacher may wish to use a specific model to develop more exercises. You will find that the valuing process is another tool for the teacher. When used, it leads children from apathy and confusion toward positive learning and life-styles.

The goal of providing the types of activities, which have been included, is to create a growing awareness for the need of dealing with existing energy problems in a positive way. Individual teachers should select objectives which they feel reflect the needs of a particular class. Each packet contains an energy concept and an awareness or accommodation concept. It is imperative to include objectives from each conceptual area as the purpose of these packets is to develop an energy conservation ethic within the students of today that they

may become conserving and concerned citizens of tomorrow. Changes may not occur immediately due to home and parental values; however, as they become adults, this learning will show its effects.

Each packet includes many activities for the teaching towards the stated objectives. Teachers need choose only those activities which they feel will accomplish their objectives. The teaching of energy and its conservation is designed to be interdisciplinary in order that students see that energy cannot be isolated from our daily lives. This is also important in developing the conservation ethic.

Within the packet, teachers will find transparencies, posters, filmstrips, etc. which may add to the teaching of energy and development of conservation. Suggestions and criticisms from teachers, consultants, etc. would be appreciated and considered in keeping these packets suitable for the majority of school systems.

Most young children in the primary grades are within the concrete operational stage, as named by Piaget. They do not have the ability to separate the abstract from something. Therefore, the activities which have been proposed reflect this and provide for greater awareness, rather than a formal study of energy. Individual teachers know their students best and will need to select items which they feel will be of greatest benefit to the education of the children. This is also the reason the concepts and objectives for the primary grades (K-2) have been combined in one packet. There are some classroom activities which require about 20 minutes each, some 40 minutes, and there are also some activities which can be done at home in order to enable children to work with their families.

TEACHER BACKGROUND MATERIAL

Energy is required to move the car on the street, move a person, or move a piece of machinery. Energy is found in many forms other than mechanical. There is heat energy, electrical, chemical, potential, and kinetic energy. The connection comes when we realize that with one form we may store energy, with another we are transforming energy, and with another we are perhaps able to transport energy from one place to another. An average person in the United States today uses as much energy as 25 people in some other countries. For air conditioning alone, Americans use as much energy as 800 million Chinese people use for everything.[1]

Almost all of the energy used in the United States (more than 95%) comes from the burning of fossil fuels--coal, oil, and natural gas. Petroleum, or crude oil, is the most important of the fossil fuels because it is not only used as a fuel but also as an ingredient in making new products, such as packaging, nylon, and fertilizers.

Daily the earth receives a total of 13.9×10^{21} Btu of solar energy; however, the earth does not have sufficient technology to store most of the sun's energy. A big "next step" in utilizing solar energy is to locate an inexpensive means of converting the solar energy into a useful energy.

Today we hear so much about energy. It is important to us because we use it each day in many different forms. Energy cannot be seen but we can see what it does. The young children will have heard the term, energy, used in a variety of ways--certain things give them lots of energy and they may feel full of energy. For your purposes, a simple definition will suffice, such as, energy makes things go.

Primary children need experiences in simple activities through which they become aware of what energy is and that things can be done to conserve energy. They can become exposed to this complex topic through establishing a connection with ways they use energy in their everyday lives. Emphasis is also given to involving parents and families in the learning process.

[1] Intercom, Sept. 1973, p. 14. "The Energy Question: Problems and Alternatives" by William A. Nesbitt.

CONCEPTS AND OBJECTIVES IN ENERGY EDUCATION

Primary K-2

Energy

1.00 The learner becomes aware that all living things require energy.

- 1.1 Discovers why their bodies need energy.
- 1.2 Recognizes that movement requires energy.
- 1.3 Becomes aware that energy exists in many forms.
- 1.4 Becomes aware of the vital role of energy in their lives.

2.00 The student becomes aware of sources of energy within the learner's home and school.

- 2.1 Becomes aware of uses of electricity in the home.
- 2.2 Becomes aware of how electricity is used in the school.
- 2.3 Examines how dependent we are on petroleum (fossil fuels) and electricity.

3.00 The learner becomes aware of the uses of energy.

- 3.1 Becomes aware of ways in which different energy sources may be used.
- 3.2 Becomes aware of the importance of energy conservation.
- 3.3 Becomes aware of the sun as a source of all energy (fossil fuel).

Persoral Awareness

4.00 The learner will become aware of energy conservation.

- 4.1 Recognizes that something can be done to conserve energy.
- 4.2 Becomes aware that the learner can do something to conserve energy.
- 4.3 Develops an appreciation and value for energy.
- 4.4 Develops an appreciation for the role of energy in their world of play, transportation, school, and at home.
- 4.5 Begins to make some value decisions affecting their use of energy.
- 4.6 Develops an appreciation for their need to contribute to an energy conservation ethic.

ENERGY ACTIVITIES
Primary K-2

1.00 The learner becomes aware that all living things require energy.

Discovers Why Their Bodies Need Energy

1.1, 1.2 The children lift or push several objects in the classroom (books, chalk, chairs, etc.). Help them recognize that work was being done and energy was provided by their muscles.

a. How do your muscles get energy?

b. Perhaps show a filmstrip which portrays, simply, how the body uses food to produce energy.

1.1 Take a walk on a nice day and have the children notice movement. Keep a list. When the class returns to the room, discuss what caused each movement they saw. They could then draw pictures of what they observed.

1.1 Let pupils participate in a series of physical exercises such as walking, hopping, skipping, jogging, running a certain distance. Then ask the children to determine which method of movement required the most energy and why.

1.1 Bring boxes of cereal for display. Ask the children why they eat cereal in the morning. Ask if other foods give them energy. Discuss that the body changes food into energy it can use. Have the children locate pictures of food or people eating food and pictures of things people can do with the energy they get from food. Glue these on paper, the food on one side, the activity on the other, to show the relationship.

1.1 Discuss with the children why it is important to eat the right kinds of food each day. Have the children draw pictures of balanced meals.

a. The children can demonstrate what they would feel like without the proper kinds of food.

b. Discuss, or demonstrate, what they could not do if they did not eat correctly.

c. Prepare healthful snacks or plan a nutritious lunch or breakfast. The class could invite parents to a breakfast they have prepared.

1.1 Ask the children where the milk they drink comes from. Discuss, show pictures, if necessary, then use the transparency (*Transparency #1*)

1.1 Make a bulletin board with the title "Where We Get Our Energy." As items are added, the class discusses them. Another bulletin board could be entitled "Energy Eaters" and show what items use energy.

Movement Requires Energy

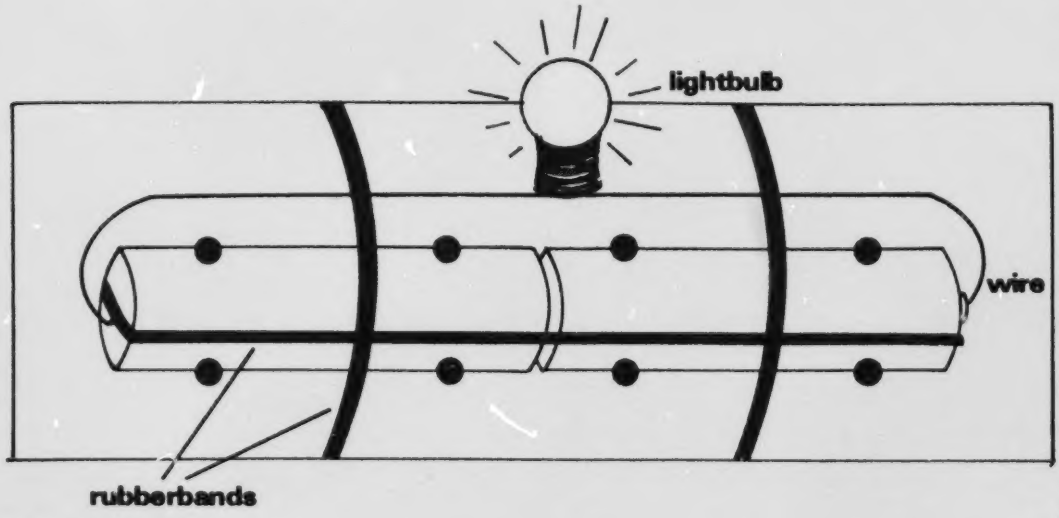
1.2 Play "Simon Says" for a short period of time. Students name some of the actions while the teacher records these on the chalkboard or a chart. Determine which movement required the most work. Guide the children to see that movement is a form of energy.

1.2 Bring materials for making a cake. Put the ingredients in the bowl, and ask the children how to mix it. Let children help with the hand mixing, then finish with a beater. Discuss energy and then ask what needs to be done next. Discuss the source of energy that makes the stove work. Bake the cake, frost the cake if desired, eat, and Enjoy! (*Transparency #2*)

1.2 Energy Coloring Book (*Masters #1-5*)
These pages show that energy is everywhere and help the children understand this idea. Discuss with the children developing this concept. Ask if the pictures show ways they actually use energy. Have the children color the pictures.

Energy Exists in Many Forms

1.3 The teacher demonstrates lighting of a light bulb with batteries and talks about electricity as a form of energy. The children could then list other things that use electricity.



Materials: 3 rubber bands
2 flashlight batteries
8 nails
2 pieces of wire (spliced bare at ends)
1 small light bulb
1 small piece of wood

Assembly:
1. Batteries may be seated between two rows of nails on a piece of wood.

2. Rubber bands may be used to hold the wires to the contact ends of the batteries and to keep the batteries securely seated between the nails on the wood base.

3. When the circuit is closed, as above, the light bulb will glow.

1.3 Hit a nail into a board with a hammer or pull one out. Touch the nail. What does it feel like? Compare it with a nail which has not been pounded in. Sand a board with sandpaper. Feel the board. What happened? Establish that hitting the nail, pulling it out, and sanding the board involve movement (body energy) and produce heat energy.

1.3 Each child brings from home a few pictures from magazines, etc. that show work being done by machines or people. Discuss and display.

1.3 Classify magazine pictures into categories of "Energy" and "Non-Energy." The teacher could develop this as a class activity, a small group activity, or as a self-checking activity for individuals.

1.3 Construct a paper pinwheel and use as a means of helping children become more aware of types of energy. Ask the children what causes the windmill to turn and what it could be used for. (*Master #6*)

1.3 Credit: My Energy...is Your Energy, Arizona Department of Education, 1974. Pop popcorn and talk about energy--how it is present in the kernel and is released. There is water in each kernel of corn which, when heated, converts to steam. The kernel expands and pushes against the tough skin of the kernel. Soon the kernel explodes and you can see the white starch of the inside kernel. Then you and your students can eat the experiment (food energy). Note the conversion of butter from solid to liquid form when subjected to heat energy.

1.3 Stand a safe distance in front of a fan to feel the force of the air. Observe the energy of the wind through the use

of pinwheels, balloons, kites, bubbles, a paper sailboat, paddleboat. Put hands under the faucet to feel the force of the water. Let the children talk about the kinds of energy they experience.

Vital Role of Energy in Our Lives

1.4 Energy Inventory Sheet (*Sheet #1*)
Talk about each picture. The children circle each picture that shows a way in which they use energy. (The blank space may be used by the children to show other ways they use energy.) Ask them if they use a lot of energy and how important energy is in their lives.

1.4 Take the children on a walk through the school. Make certain the class has talked about energy and uses the definition "energy makes things go." Stop in several rooms and ask the children where they can find energy being used in each room. Upon returning to the classroom, use the Survey Sheet #2 so the class can compile information before beginning their drawings about the energy walk. The children can then draw pictures of where they saw different forms of energy being used. (*Survey Sheet #2*)

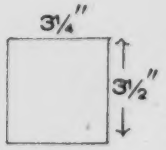
1.4 Establish an independent activity station using the "Magic Box." Use pictures from Learning Station #1, 2 and glue these to pieces of tagboard. At each station, the child makes a decision regarding the picture, puts the picture card in the magic box, and receives the correct answer. Learning Station #1--the child examines pictures of different types of energy, and decides if the action uses his energy, the sun's energy, or electricity, and places the picture in the magic box for the answer. Learning Station #2--the child examines pictures of people wasting energy and people conserving energy, then decides which is happening, and places the picture in the magic box for the answer.

How to Make a Magic Energy Box

Materials: box with a cover (we recommend shoe boxes)
tagboard
tape
bright, attractive contact paper
cutting tool (razor blade, sharp scissors)

1. Decide on the approximate size of task cards. Cut from tagboard. One side will contain a picture from Learning Station #1 or 2. The reverse side will contain the answer.

i.e.



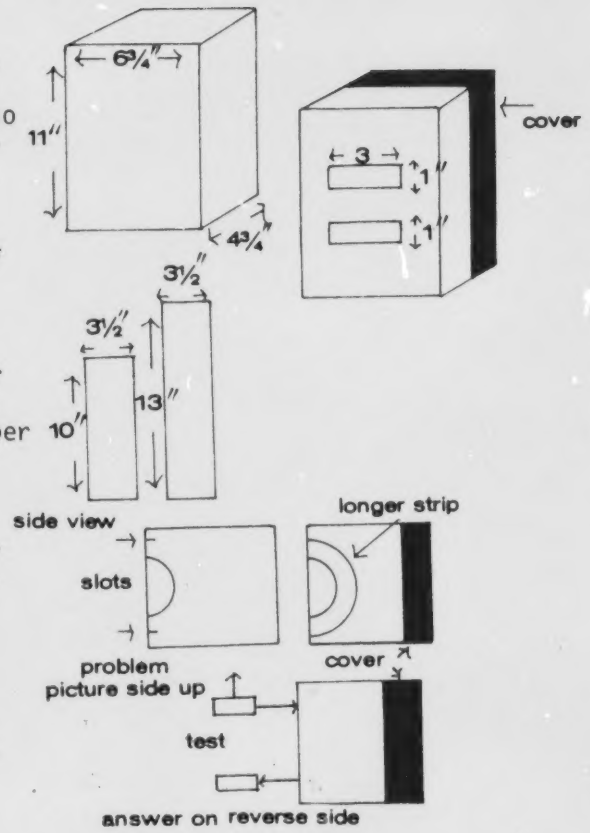
2. Select an appropriate size box. Consider the depth of the box--deeper is generally better.

3. On the bottom of the box, cut 2 slots, 1" long and 1/8 of an inch wider than your task card. Slots should be cut so that their sides are parallel and centered one above the other at opposite ends of the box.

4. Cut 2 strips of tagboard with width of the slots. Make one strip about 3" longer than the other.

5. These strips will form a path for your task cards. Attach the small strip with tape to the lower edge of the upper slot, and the upper edge of the lower slot. Attach longer strip to upper edge of upper slot and lower edge of lower slot. Test your path by inserting task card problem side up in the upper slot. (You may have to adjust the strips if the task card does not insert easily and return smoothly.) Return cover to box.

6. Now cover box with contact paper, etc. for an attractive magic box.



Please Note: Any size box may be transformed into a magic box.

1.4 Show pictures which provide examples of energy existing in many forms (chemical, mechanical, heat, light, food), examples of where energy comes from (coal, natural gas, oil, geothermal, wind, sun), and examples of how energy is a part of their lives (cars, TV, etc.).

1.4 Write an experience chart story of what the children have learned about energy and energy conservation.

1.4 Growing activity--plants, seeds, etc. Children plant seeds and watch and record what happens. Help the children keep a chart (very basic one).

4.00 THE FOLLOWING AWARENESS ACTIVITIES ARE CORRELATED WITH THE ABOVE CONCEPTS. The learner will become aware of energy conservation.

Something Can Be Done to Conserve Energy

4.1 In order to help children grasp an understanding of the term "conservation," show a lollipop, popsicle, or a

piece of hard candy. Ask what would happen if you took bites. Ask if there would be a way to eat it that would make it last longer. Then use the term "conservation" and relate it to energy.

4.1, 4.2 Make "I Can Conserve Energy" booklets, depicting energy in use around the home and at school, or methods of preventing its waste.

4.1, 4.2 Construct mobiles "Ways We Can Conserve Energy." Use coat hangers, yarn, pictures either drawn by the students or colored ditto drawings on how we can save energy (i.e. turn off light, ride bike, close door in winter, keep refrigerator door closed, don't let faucet drip, etc.).

4.2 Talk with children about what they do on a Sunday afternoon at home. Discuss whether these activities require much energy. What activities require little energy? Have the students draw pictures of what they can do on a Sunday afternoon at home which would not require a lot of energy.

4.2, 4.6 Teacher obtains a copy of Only Silly People Waste, by Norah Smaridge (Abingdon: Memphis, Tennessee, 1976, $4.25) and reads to the children. These are silly poems that introduce the importance of conserving energy and materials.

4.2, 4.5
4.6 Voting
The teacher uses the following questions, or similar ones, to help children begin the process of making value decisions. The children respond to each question by raising or not raising their hands. Discuss whatever seems to be of most interest to them at the moment, in regard to energy.

How many of you...

1. _____would like to eat whatever you want?
2. _____have many toys with motors or batteries?
3. _____like to color or read a book instead of watch T.V.?
4. _____have your parents take you in the car wherever you need to go?
5. _____have discussed with your family ways to conserve energy?

Appreciation and Value for Energy

4.3, 4.4 Set up a class chart of helpers. Include a "lights-out" helper or an "energy saver."

4.3, 4.4 Discuss ways in which the class could conserve (don't waste paper, turn out lights when not needed). Make a list or chart and post in the room. Student drawings could dress it up.

4.3, 4.4 The teacher sends home copies of *Master #7* which contain questions the children can use in a discussion with their families.

a. Encourage children to find out how their families are conserving.

b. Class discussion where children can report back on things they found out at home.

4.3, 4.4 The teacher sends home copies of *Master #8* for the family to work on together. Children could be encouraged to return these or talk about them.

4.3, 4.4 Pass out drawing paper for an art lesson (related to energy or not) and tell them they will not be allowed any more paper. If they make a mistake, they will just have to include the mistake in the drawing or art work.

4.3, 4.4 Tell the class you do not have enough paper towels to last until the next shipment comes in. Ask them what can be done to solve this problem. Then tell them there are only 5 more sticks of clay for the rest of the year. What can they do in a situation like this? Introduce the word conservation and talk about conservation of supplies in the room. What do you do with the scraps? At the end of the day, check the trash can to see if there are things which could be used another way (recycled).

2.00 The student becomes aware of sources of energy within the learner's home and school.

Uses of Electricity in the Home

2.1, 2.5 In one day, keep track of each time you use electricity. List the purpose for each use of electricity. (*Student Survey Sheet #3*) Send it home on a weekend with a note to the parents explaining what the students are doing. Ask that these be returned on Monday.

2.1, 4.3 Determine the different uses of energy in your home and rank them from highest to lowest use. Compare lists and discuss what this shows about your life-style (the way you live). (*Student Survey Sheet #4*)

NOTE: Do the numbering of the ranking at school, only if the students seem able.

This, too, could be sent home on a week end and returned on the following Monday. A note of explanation should be included.

2.1, 2.2 Make a display of items that are powered by electricity for classroom use. Allow time for children to observe and ask questions. Ask them to decide which of the items could be eliminated and what they would use instead of that item.

2.1, 2.3, 4.3 Credit: Living Within Our Means: Energy and Scarcity, Environmental Education Instructional Activities, K-6, The University of the State of New York, The State Education Department, Activity 5, p. 32.

Show children a picture of people sitting around a campfire (*Picture #1*). Ask what the main uses of the heat of the campfire are. Children will probably say to cook and to keep warm. Ask children how many different things they think they have in their houses to perform the two basic functions of cooking and heating. Their guesses will probably cover a broad range. Give children old magazines and department store brochures advertising housewares and appliances. Have them cut out everything they can find that helps people use heat energy. After many pictures have been collected, recall the campfire, and ask what fuel was used to provide the energy needed for most of the items in the pictures. Start a bulletin board display titled "How We Use Heat Energy in Our Homes." Set up columns for the different fuels suggested by the children: natural gas, gasoline, oil, wood, charcoal. Attach the pictures to the appropriate columns. Or simply display pictures collage fashion:

a. What are the advantages and disadvantages of using a campfire for cooking and for keeping warm?

b. Which column on the bulletin board has the most pictures?

c. How many of the jobs done by the appliances shown on the bulletin board could have been achieved without using an appliance at all?

d. Why do Americans use all of these different items?

e. What do you suppose is happening to our supplies of fuel?

Uses of Electricity in the School

2.2 Invite the school custodian into the classroom and let him explain how he uses electricity to help him in his work in the school. He could also explain how his work would be different without electricity. What has he done to help the school save electricity? Ask him to help the children plan ways they can save electricity or other energy in their classroom.

2.1, 2.2 With the help of parents and teacher, students look at the wattage on light bulbs, read the figures, add them up and compare home consumption with classroom consumption. Can they think of reasons for a difference? What are things they could do to save on the amount of electricity they use with lighting? Someone from the utility company could be invited to help provide suggestions for saving with lighting.

2.2 The children could take an "Energy Walk" through the school. (See 1.4 in the Primary K-2 packet.)

2.2 Credit: Project I-C-E, 1927 Main Street, Green Bay, Wisconsin 54301.

Students bring to class pictures of their home and family, as well as catalogs and magazines. The students go through the catalogs and magazines cutting out pictures of things that need electricity and putting these pictures into two groups: Those their families need and those "extras" that they want. Discuss with the students the idea of necessities (needs) and luxuries (wants). After classifying the pictures the students should choose the electrical items they can't do without. Use the pictures to make a collage or mobile.

2.2 Energy Coloring Book (*Masters #9-12*)
These pages develop the idea that energy does many things. Discuss the concepts as the children work through the book.

Dependence on Petroleum and Electricity

2.3 Traffic Survey (*Sheet #5*)
This should be done during school time. Locate a busy intersection and with survey sheets and pencils in hand,

chart the number and kinds of traffic. Also record the time. This could be done at two different time periods. When back in the classroom, compare the survey sheets. Then, using *Master #13* (use *Master 13A* if you live in a larger city), have each child graph the numbers they collected on their sheets. Discuss freely, as to amount of gas for so many vehicles, car pools, mass transportation, etc.

2.3 Credit: The Energy Book, South Carolina Department of Education, Columbia, South Carolina 29201.

Ask the children to bring in pictures from magazines and/or to draw pictures of things such as houses, automobiles, boats, refrigerators, TV sets--things that they believe they would like to own or have available for their use when they are as old as their parents. Assemble the pictures and/or drawings in a large collage. Discuss the extent to which their "good life" depends on petroleum, electricity, etc. Should "old folks" be saving gasoline and electricity now so that plenty will be available for use 25 years from now? Why or why not?

2.3 Show *Transparency #3* and *#4* to help children understand what is behind the story of electricity. An upper grade class may be asked to help develop a steam generator to share with the children.

4.00 THE FOLLOWING AWARENESS ACTIVITIES ARE CORRELATED WITH CONCEPT 2.00. The learner will become aware of energy conservation.

Something Can Be Done to Conserve Energy

4.1 Credit: Energy Conservation: Experiments You Can Do, Thomas A. Edison Foundation, 1974. See experiment sheet #1, How does insulation work? and #2, How do storm windows work?

4.1 Demonstrate our energy problem using a bowl which contains pebbles and pieces of candy. Tell the children that the candy represents energy like oil, coal, natural gas, etc. Ask what happens when they use up the energy. (Let them eat some of the candy.) They will begin to dig for more just as we are doing now. The children then can suggest ways to conserve energy.

4.1, 4.2, 4.3 Make an energy conservation bulletin board. Children collect articles, pictures, cartoons to show ways to save energy. Discuss as they bring them in.

4.2, 4.3 Each week select two students to serve as energy savers. They would be responsible for turning off lights, checking or reading the thermostat, raising or lowering blinds, etc.

4.3 Energyland Game (*Gameboard #1*)
Source: Science and Children, November/December 1976, pp. 18-20.
This allows for review of energy terms and provides an opportunity to think about the things which have been discussed.

4.3 Send home with the children copies of *Master #14*. Arrange for feedback during the week as to the types of family discussions about energy which were held and what the families have decided to do.

4.3, 4.6 Voting--Values Clarification Activity

The teacher uses the following questions, or similar ones, to help children begin the process of making value decisions. The children respond to each question by raising or not raising their hands. Discuss if the class seems receptive.

How many of you...

1. _____ have more than five toys that have a motor or run on batteries?
2. _____ like to watch TV in your spare time?
3. _____ help turn off lights at home when not in use?
4. _____ helped your parents make a list of ways you could conserve energy at home?
5. _____ walked more than you rode in the car this week?

4.3 Announce that drinking water is becoming scarce and we need to ration drinks of water to 3 drinks per day. Allow them only a short drink (teacher could count while they drink, etc.). Ask them ways they could get more water if they needed it. Allow them to use their imaginations.

3.00 The learner becomes aware of uses of energy.

Uses of Different Energy Sources

3.1 Have the students state 3 advantages and 3 disadvantages of each of the following electrical appliances:

*toothbrush	*air conditioner
*water heater	*television
*freezer	*stove
*space heater	*dishwasher

3.1 Display *Poster #1* showing ways different energy sources may be used. Discuss with the children. Have them look for examples on their way to school and in their homes. The class could then report back the next day.

3.1 The teacher or children make puppets for the story, "The Best Present of All," a reprint from Ranger Rick. A single free copy is available from the National Wildlife Federation, 1412 Sixteenth Street, N.W., Washington, D.C. The story can then be read or simplified and acted out.

3.1, 3.2, 4.6 Credit: Living Within Our Means: Energy and Scarcity, Environmental Education Instructional Activities, K-6, The University of the State of New York, The State Education Department.

Discuss with the children the idea of food as a source of fuel for our bodies. The similarities of fuel-use by people (food) and fuel-use by machines (gas, gasoline, oil) should be established. When they have identified basic sources of energy, several in the class might play the role of "energy inspectors." The "inspectors" would examine the classroom, school building, and the home to determine where and what kind of energy is used (electrical outlets, lights, radiators, furnaces, school buses, projectors, televisions). As an extended or continuing activity, have the children draw or collect pictures of energy-using devices in home or school.

a. Why is energy so important?

b. Are all of the energy-using devices really necessary?

c. If you could keep only five things in your home which use energy, which would you choose? Why?

Importance of Energy Conservation

3.2 Following a discussion about different types of energy, divide a 9"x12" piece of paper into three sections. In

each section, use pictures from magazines, etc. to show three ways wind (or water, or wood, etc.) is used as a source of energy. If magazine pictures are not available, the children could make drawings.

3.2 Students devise a booklet to determine how they use energy. The booklet would be composed of pictures showing ways in which they use energy. The pictures could be drawings, newspaper and magazine clippings, and photographs.

3.2 Make a simple windmill (four or five popsicle sticks with cardboard for paddler glued to the stick). Drive the windmill with a fan. Discuss how farmers used the wind at one time and what work the wind might do for us. It might also be helpful to invite a local farmer to explain to the children how a windmill was/is used, or if possible, visit a farm with an operating windmill.

3.2, 4.2 My Energy Book by Energy Ant, Federal Energy Administration. Send for copies at the following address:

Federal Energy Administration
12th and Pennsylvania Avenue
Washington, D.C. 20461
or
U.S. Government Printing Office
Washington, D.C. 20042

(Ask for "Energy Conservation and Resources" (SB-058).

3.2, 4.3 Make SAVE ENERGY badges. Discuss the need for doing something, then design the badges. The children can make a list of people they will give badges to.

Sun as a Source of Energy

3.3, 4.2, 4.3 Grow a garden using manures and compost and encourage rotation of crops to emphasize the importance of doing your part in overcoming the energy shortage. It takes extra energy to manufacture fertilizers. Discuss.

3.3 Demonstrate the sun's warmth. Use one thermometer in the sun and one in the shade to show temperature differences. This is a good exercise for learning to read a thermometer. This could also be done using a pan of water in the sun compared with the temperature of a pan of water in the shade. You could have two groups, each doing an experiment then sharing results.

3.3 Demonstrate how the sun provides light. Take children outdoors into sunlight, then into a windowless room without lights. Discuss the difference.

3.3 Demonstrate the bleaching power of the sun--arrange leaves, shells, rocks, etc. on colored paper and put in the sun for a few hours around noontime. Remove the items and discuss what the sun has done. The sun can make things change. Turn this lesson into an art project by outlining the shapes with seeds, beans, etc. or creating realistic drawings from the bleached shapes utilizing crayon and imagination.

3.3 *Transparency #5*. Show class the transparency and discuss how sunlight plays a role in producing fossil fuels (helps plants to grow, aids in their transformation into coal, oil, natural gas). Use the children's interest and knowledge of dinosaurs to relate how very long ago this change began and how as dinosaurs and plants died, and others grew and died on top of them, etc., this caused each layer to press down upon the others, thus changing plant matter into coal and likewise plants and animals in marine sediment changed into oil, and natural gas.

Make a terrarium with different colored layers representing layers of soil. Use black licorice or a shoelace to represent coal seams.

3.3 The class makes a bulletin board display showing ways the sun gives energy. The display could be limited to pictures, cut from magazines, etc. or could be a combination of pictures and drawings by the students.

3.3 Display *Poster #2*. Show *Transparency #6* which depicts the earth receiving energy from the sun and giving off heat. Children can discuss examples such as the sidewalks, roads, beaches, etc., on hot summer days. If this is done on a hot day the children can actually experience these things outdoors.

3.3 The students, or class, write poems which describe their feelings about the sun. Another poem could describe how they would feel if there were no sun. These would be excellent to share as a language arts activity.

3.3 The class could write a story about "The Day the Sun Disappeared." Depending upon the ability of the students, you may wish to have the story done either as an individual or group activity. Share the stories in a language arts experience.

3.3 Sing songs about the sun. Check the school's music books and discuss with the music teacher. The students could take a popular song such as "Old MacDonald" and write a song about the sun to that tune--this would be done as a class activity.

3.3 Show how the sun makes plants grow. Place one pot with a newly sprouted plant in a sunny window and another in a dark

closet. Check every few days and discuss. Don't forget to water the plants! Help the children keep a chart of their observations as this will aid discussion.

3.3, 4.2 Source: Energy Conservation: Experiments You Can Do, Thomas A. Edison Foundation, Inc., 1974, "Let the sun help heat your home." Use master from packet marked Experiment #3.

3.3, 4.2 Source: Living Within Our Means: Energy and Scarcity, Environmental Education Instructional Activities, K-6, The University of the State of New York, The State Education Department.

On a sunny day in the early spring, take a class into a room on the sunny (south) side of the building. Then go into a room on the shaded (north) side of the building. Ask the children if the air temperature felt different. Elicit that the first room felt warmer and the sun had warmed it. Ask which side of the school usually gets the most sun. If they cannot remember, take the class outside at different times on a sunny day. They will discover that the south side gets the most sun and the north gets less. Explain that the side facing the sun should have many large windows to take advantage of the sun's warmth, and that the opposite side of the building should have fewer windows. Then explain that curtains should be utilized to shut out the cold on a dark winter day or the sun on a hot summer's day. Encourage the children to plan and build several diorama "houses" which would utilize the sun's warmth for heating. Place the completed houses on the window ledge in a sunny room. Discuss with the children how the houses should be oriented. To test their hypothesis, several houses should have the large windows facing away from the sun. Small dishes of water placed in the houses could be checked for temperature change.

3.3 Discuss how hours of light influence things we do. Children may wish to role-play some of the activities done at times of specific amounts of light.

3.3 Discuss names of living things which depend directly on the sun for their energy. Draw pictures of them and make a display, or assign groups to draw specific pictures and assemble into booklet form.

3.3 Trace an item of food to its plant source. (i.e. meat-store-packing plant-farmer-pig-sun) Use the Food Chain Stamps, Master #14, for a better visual representation of this chain. The students are given a copy of the sheet, instructed to cut the stamps apart, and put them in order--either beginning with the product and tracing back to the source, or beginning with the source and tracing to the product.

4.00 THE FOLLOWING ACTIVITIES ARE CORRELATED WITH CONCEPT 3.00. The learner will become aware of energy conservation.

4.0 "Energy Box"
The children bring actual objects and/or pictures that relate to our shortages and our environment (pieces of wood, trash, vial of motor oil, gas tank cap, etc.). Use the box as a source for discussion for small groups, or for the entire class.

Something Can Be Done to Conserve Energy

4.1, 4.3 Conservation Checklist (*Sheet #7*)
Make enough copies for the children, distribute them, give the directions, and after completion, discuss what was marked and why.

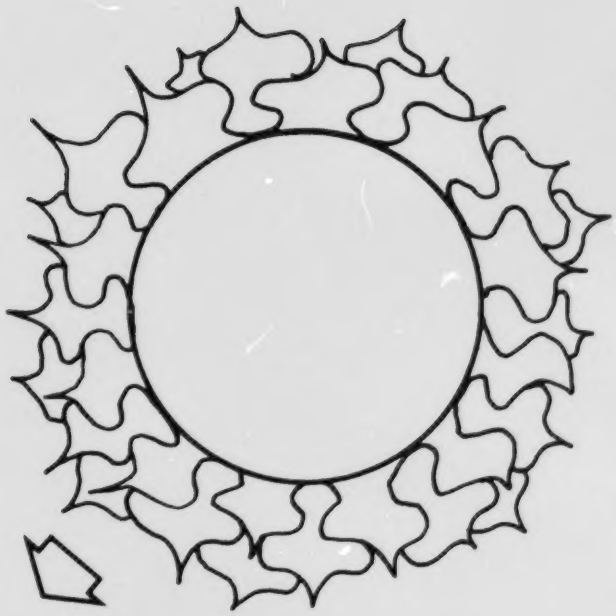
4.1, 4.2 Work to learn more about recycling. Contact waste disposal people, environmentalists, etc. to help children see how they can recycle to save energy. It takes less energy to make products from used or recycled materials. Does your community provide ways to help you recycle?

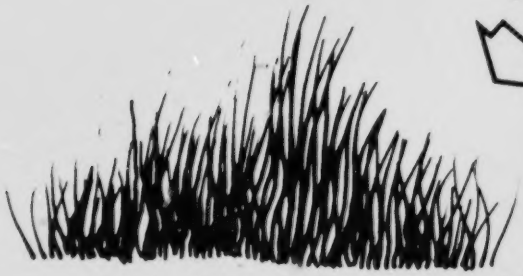
4.2, 4.3 Each week, after students decide which energy-saving method they want to emphasize, have them draw pictures and write stories about it. They can take these home to alert parents to the need to save energy.

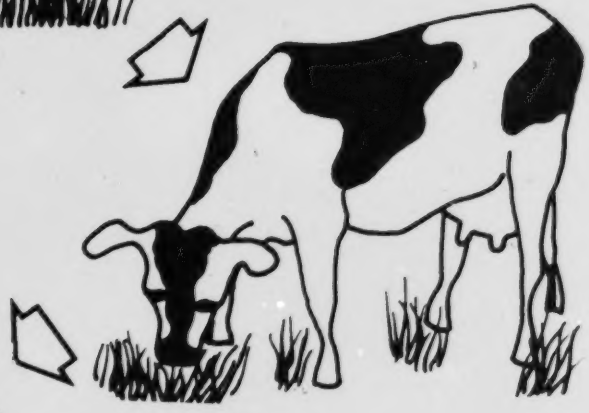
Appreciation and Value for Energy

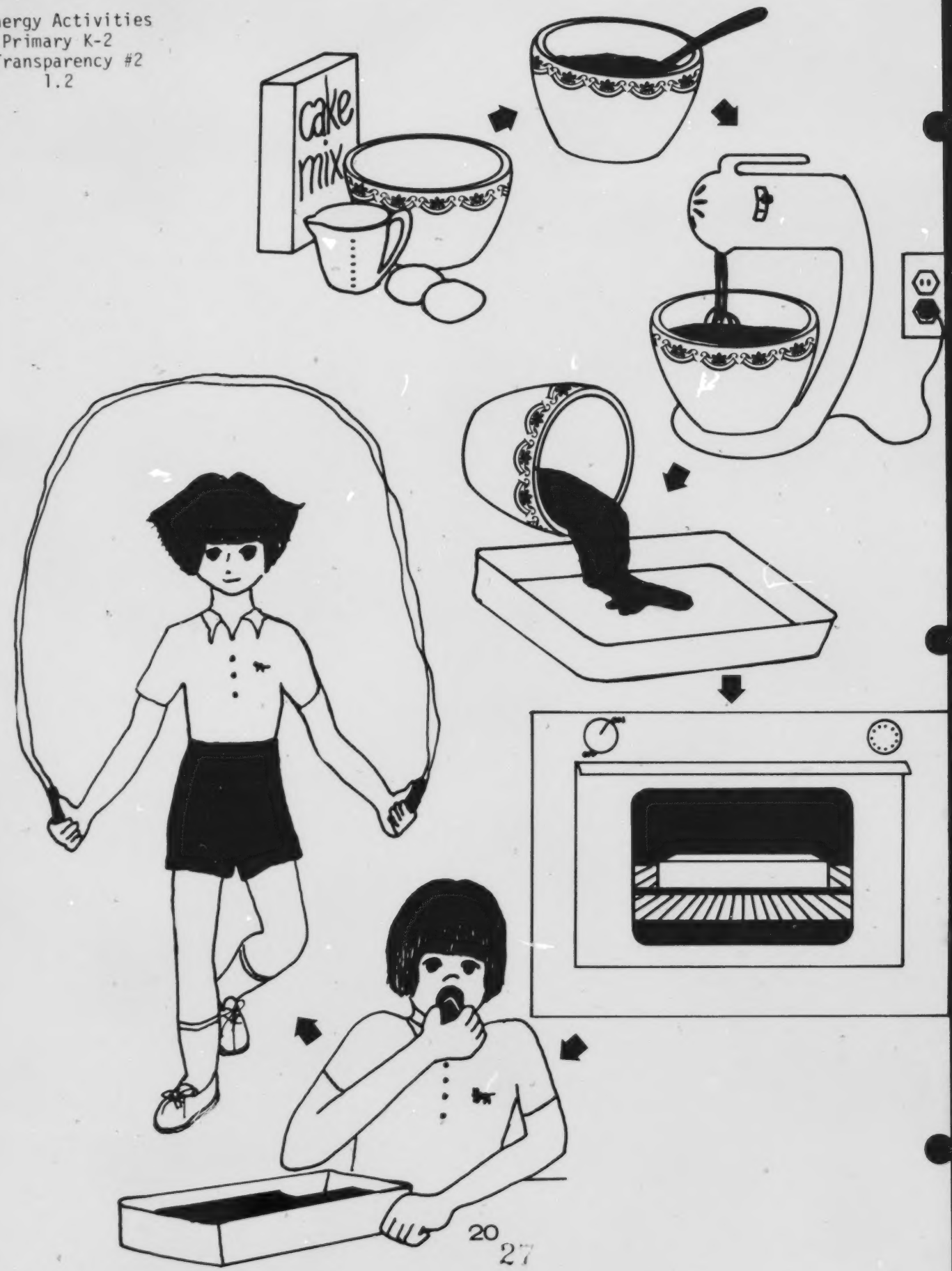
4.3 Send a letter home (*Master #15*) which contains questions the children can use in a discussion with their families about energy.

MILK GIVES ME ENERGY







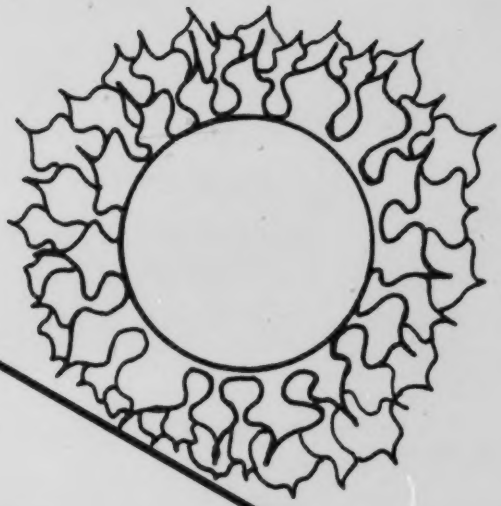

cake
mix

PEOPLE

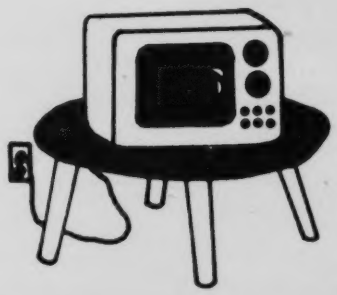
USE

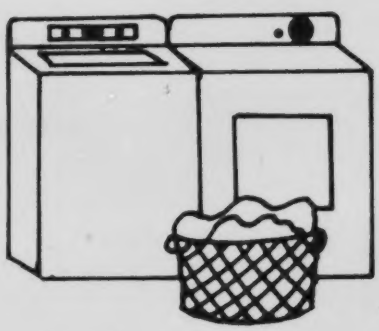
Energy

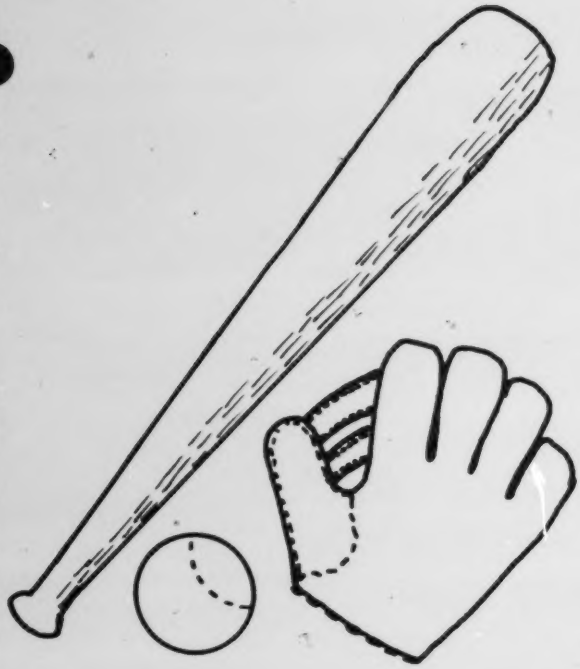
EVERYWHERE

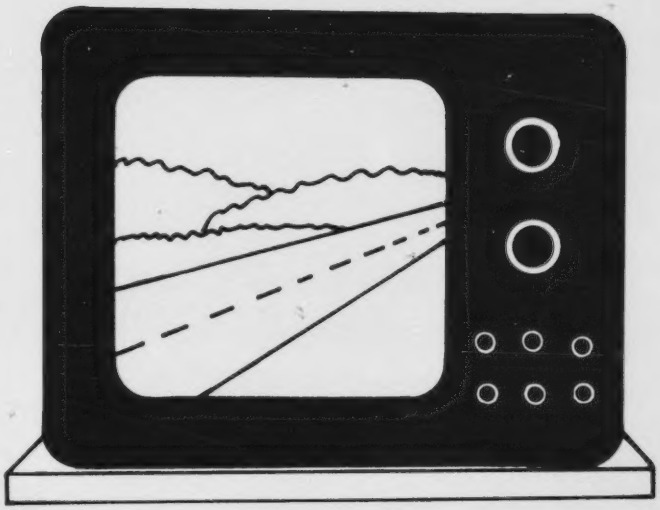


HOME

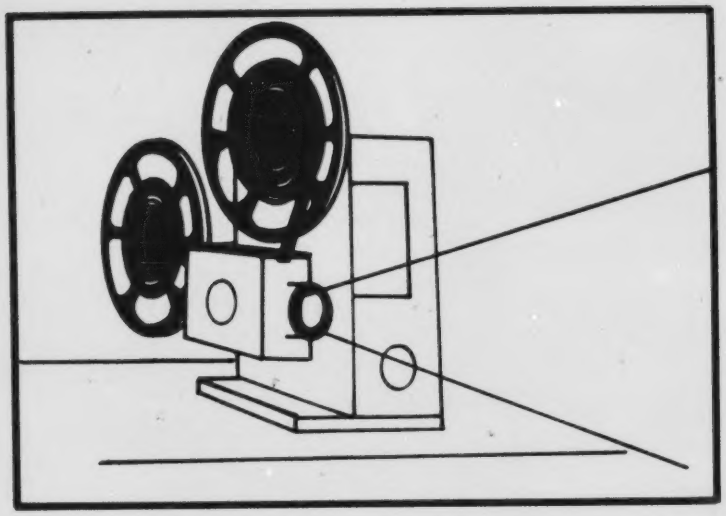


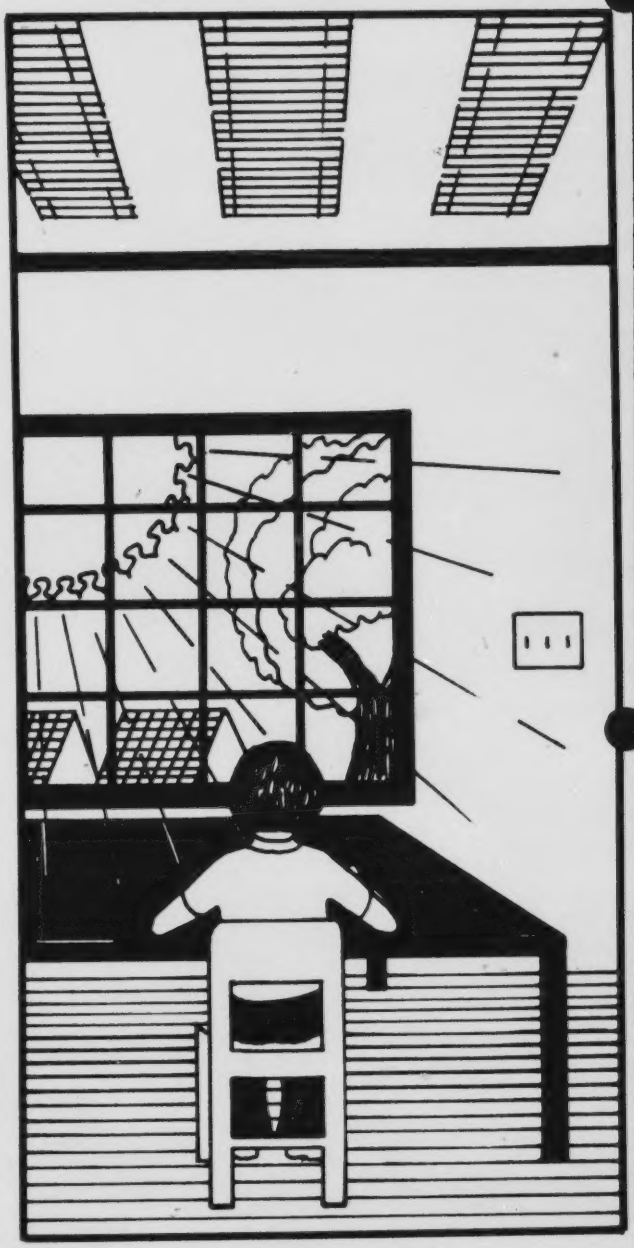




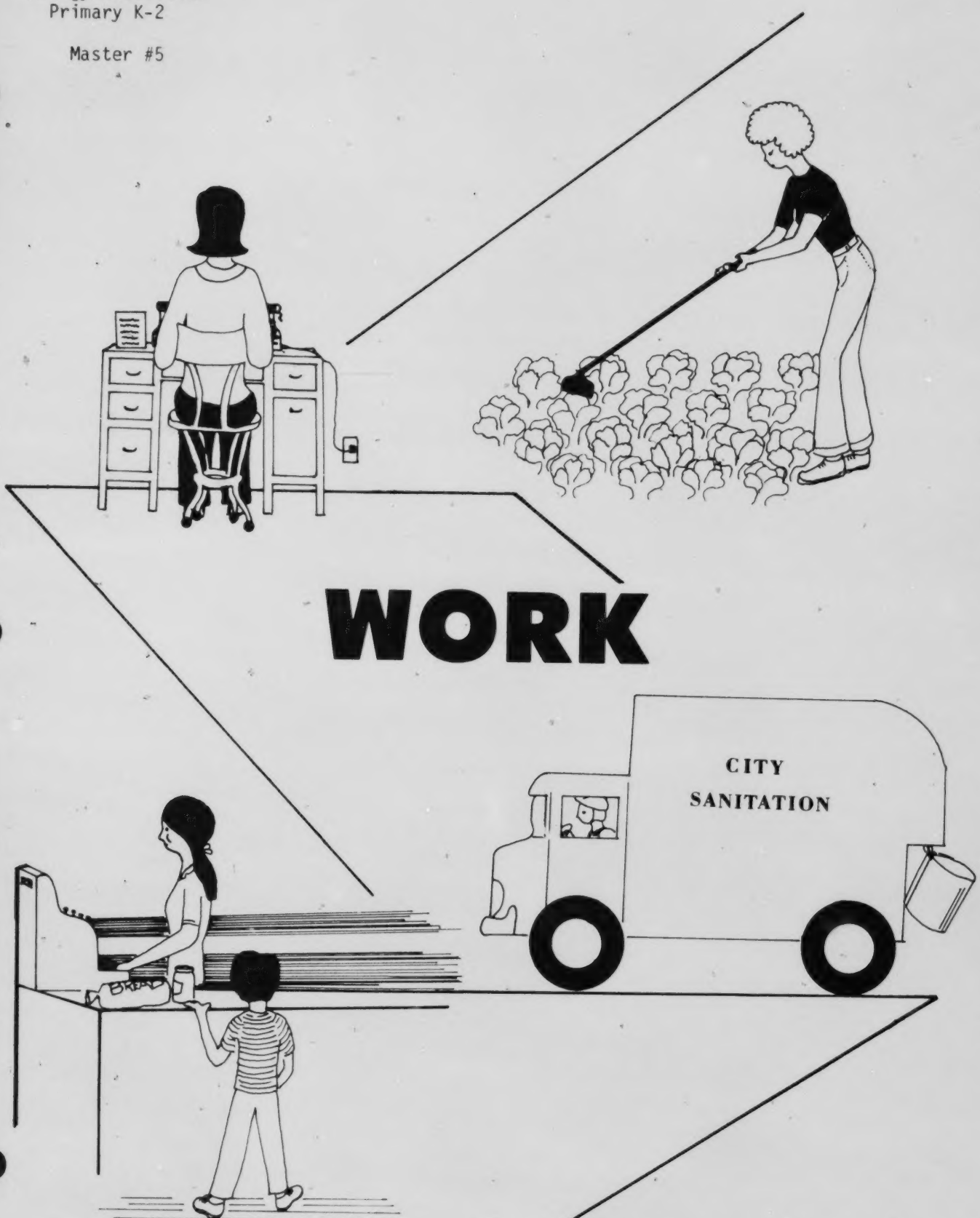


PLAY

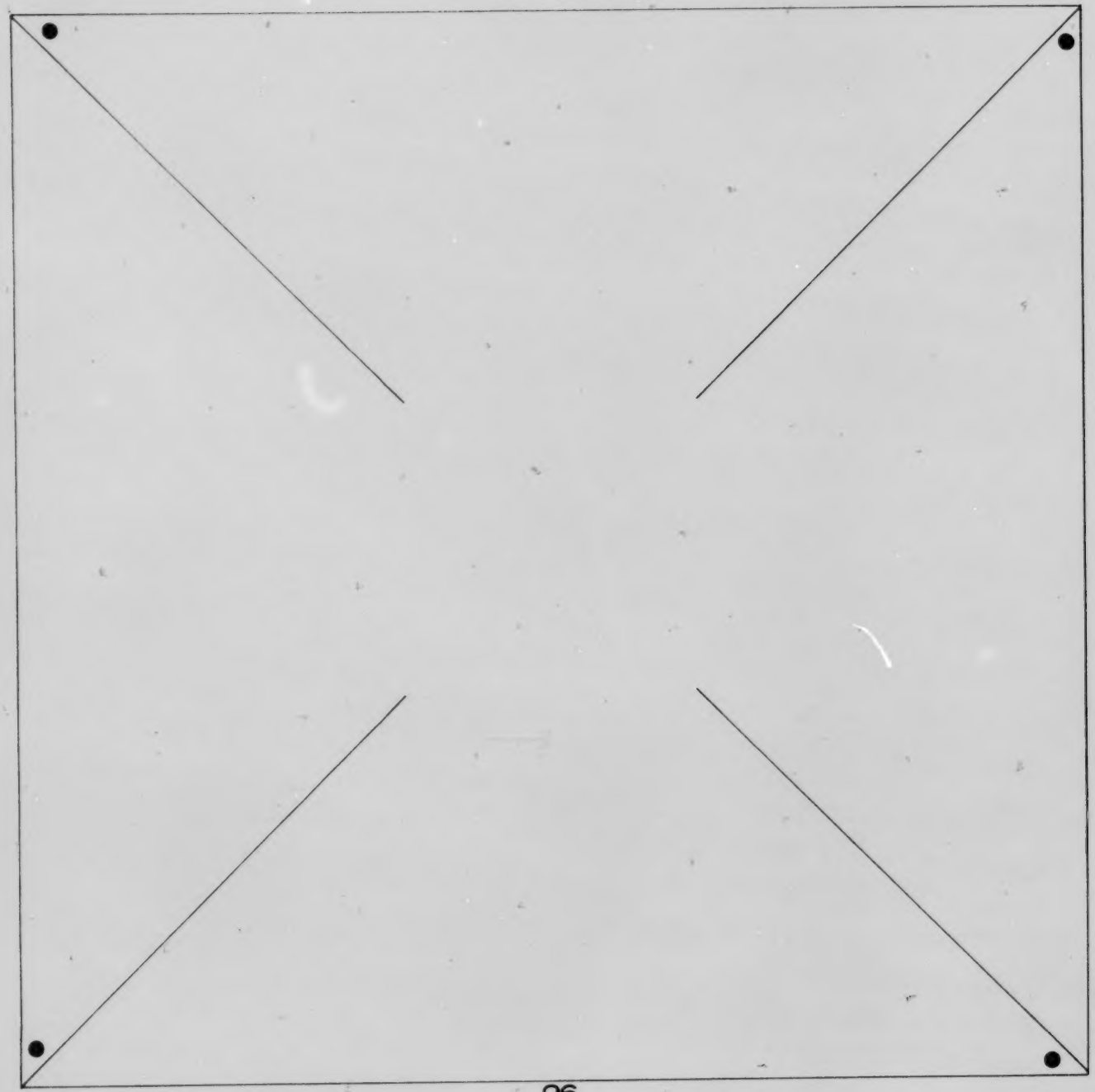




SCHOOL

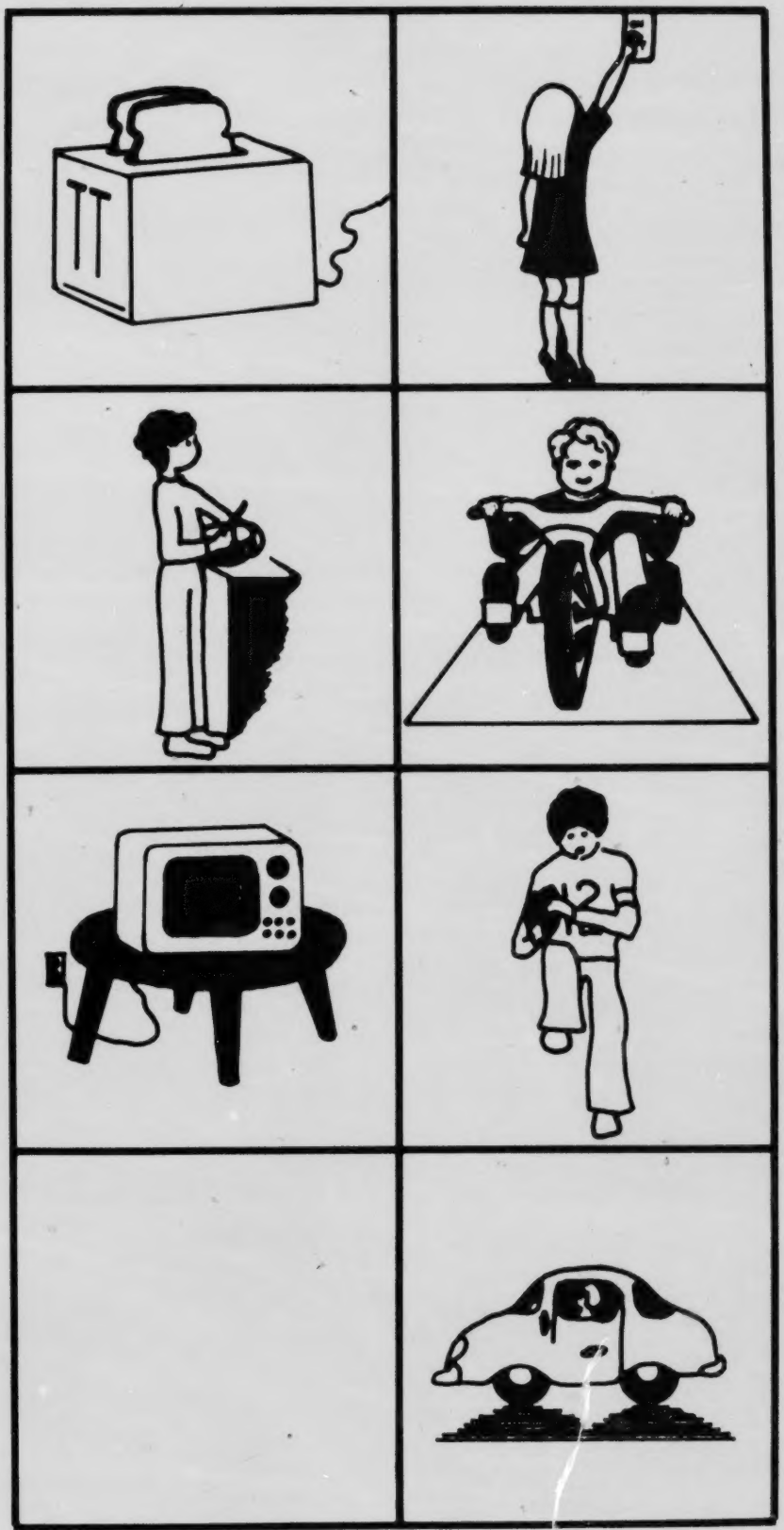

WORK
CITY
SANITATION

Pinwheel Pattern



Energy Inventory Sheet

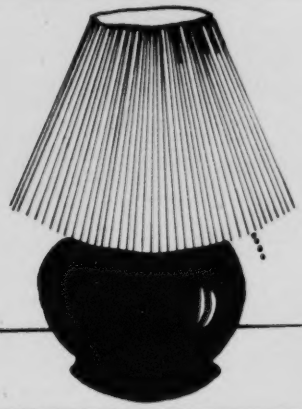
How Do You Use ENERGY?

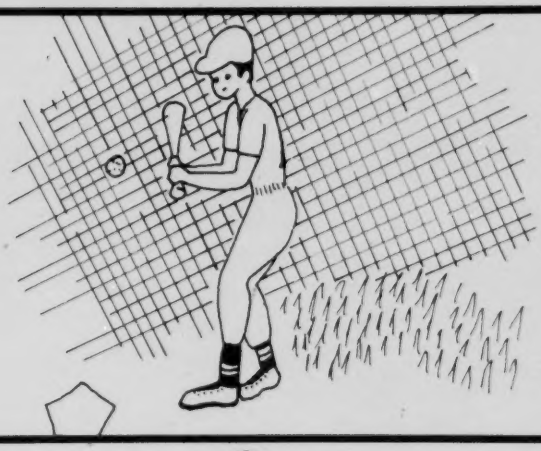


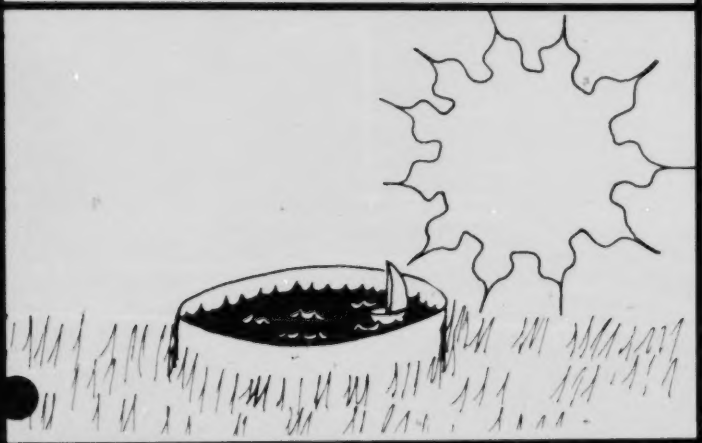
Energy Walk in the School

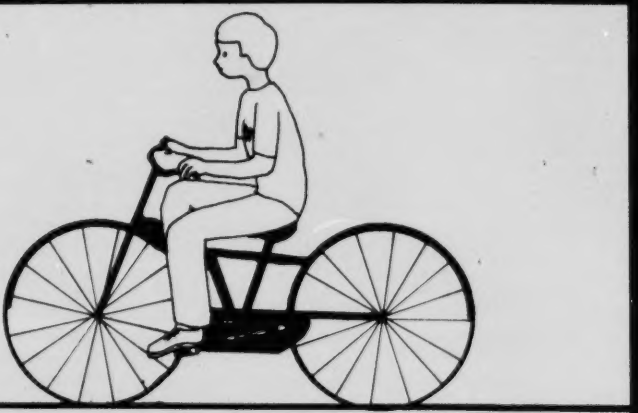
1. Which rooms did we visit?

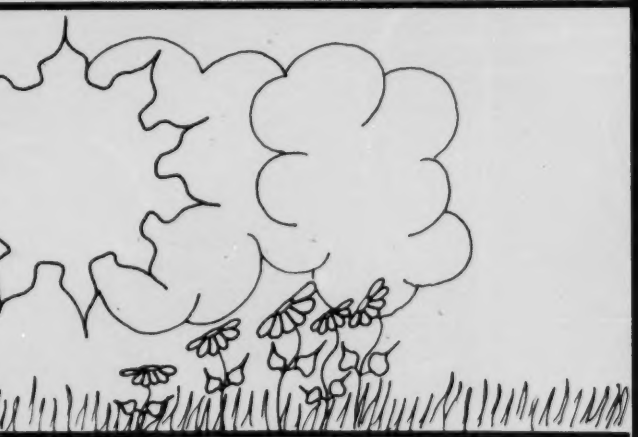
2. Where did we find energy used in each room?

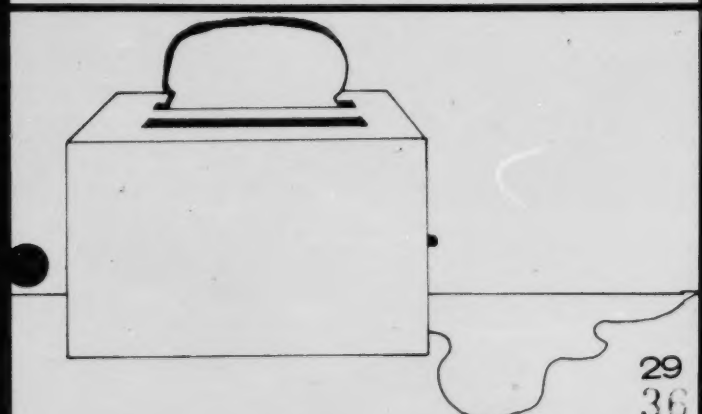


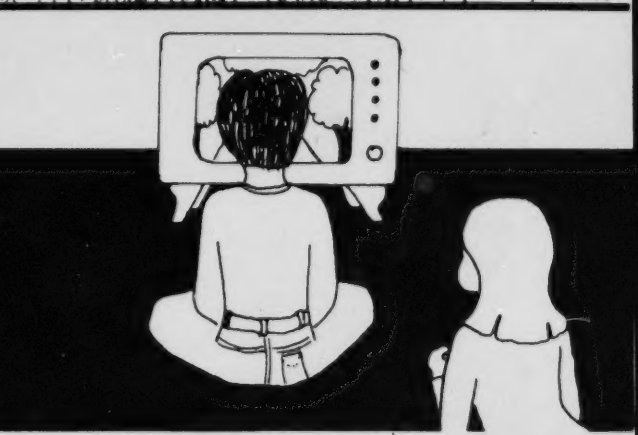


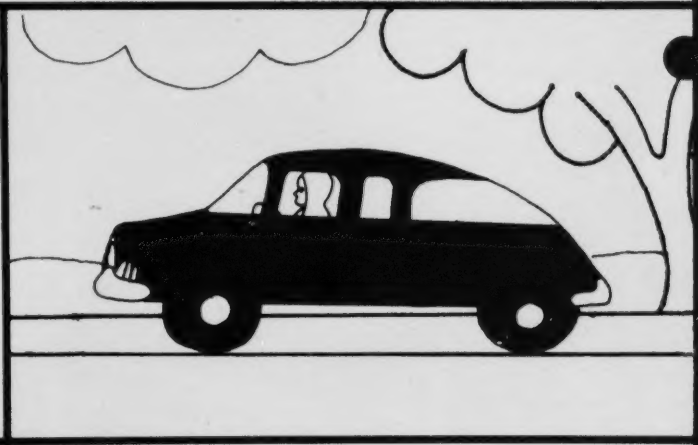


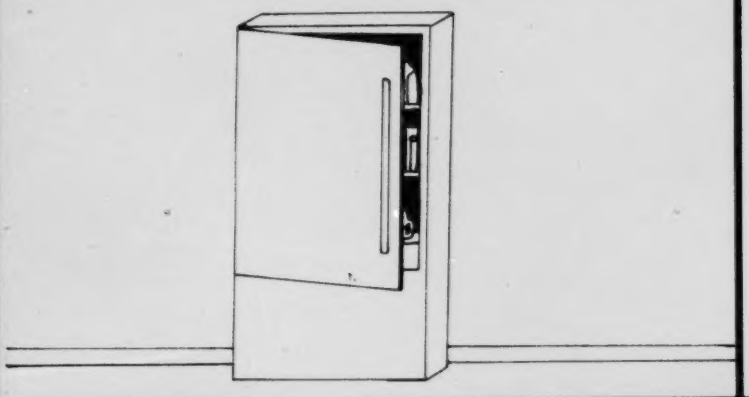


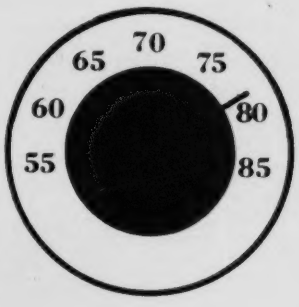








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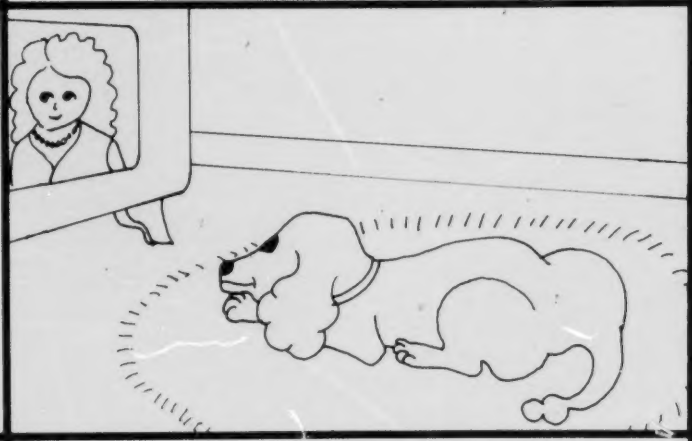
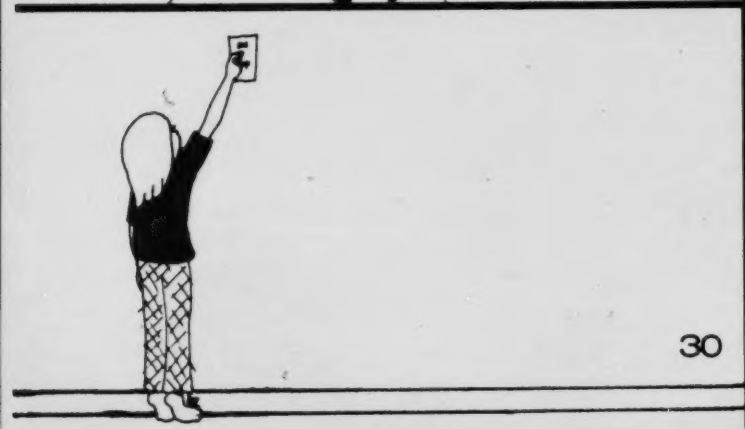
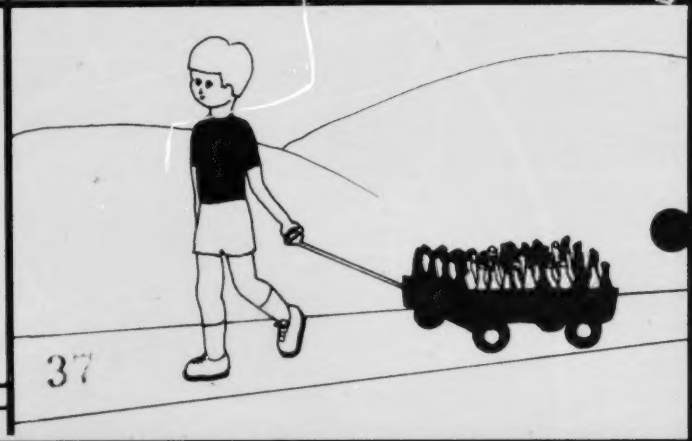
dan's grocery







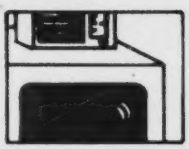
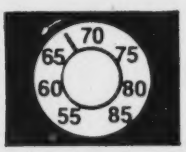
Dear Parents,

The children are busy learning about energy. They are also finding ways to conserve energy. Please use the following questions to begin a family discussion of energy. In this way the children will recognize the connection between what they learn at school and how they live. In the next day or so we will spend time discussing what the families talked about.

Thank you for your help.

1. How do people get energy?
2. Do we plan our meals so we get the most energy from what we eat?
3. What kinds of energy do we have in our home?
4. Where does energy come from?
5. What things in our home use the most energy?
6. What are we doing so we are not using too much energy?
7. What else can we do to cut down the amount of energy we use?

HOW DOES YOUR FAMILY RATE?

YES	NO		
☐	☐		Do you walk or ride bike instead of always using the car?
☐	☐		Do you turn off lights when not needed?
☐	☐		Do you keep the sun out on hot days?
☐	☐		Do you turn off TV and radio when no one is looking or listening?
☐	☐		Do you let the sun in on cold days?
☐	☐		Do you wear warmer clothes when it is cold?
☐	☐		Do you keep the thermostat lower in winter?
☐	☐		Do you try not to be wasteful?

How many times did you mark the "yes"? _____

How many times did you mark the "no"? _____

HOW DO I USE ELECTRICITY?

	What I Used That Used Electricity	The Reason I Used Electricity
(example)	1. Blender	1. Make chocolate shakes
	2.	2.
	3.	3.
	4.	4.
	5.	5.
	6.	6.
	7.	7.
	8.	8.
	9.	9.
	10.	10.

ENERGY IN MY HOME

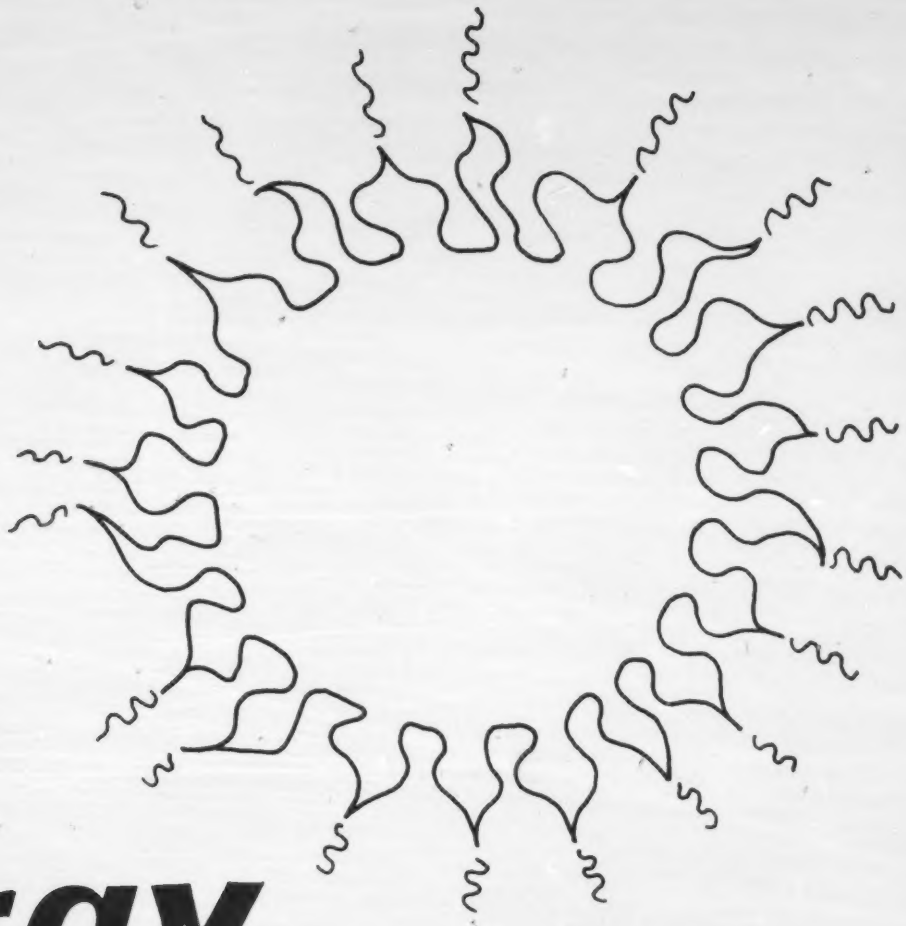
The different ways I use energy in my home.

What I use the most.

What I use the least.

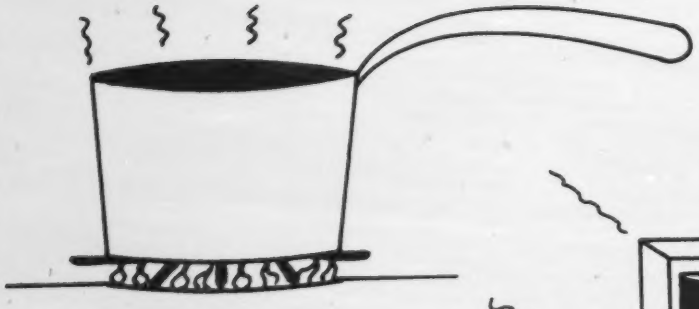
Energy

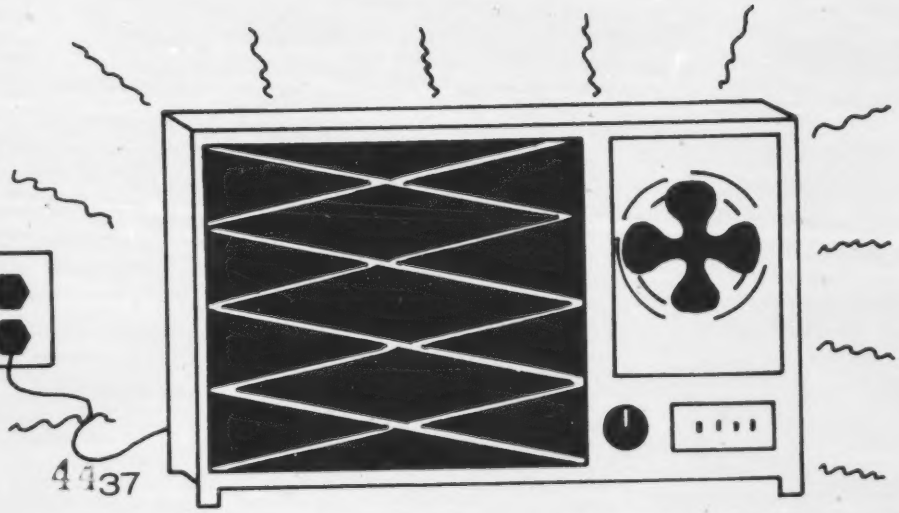
DOES MANY THINGS



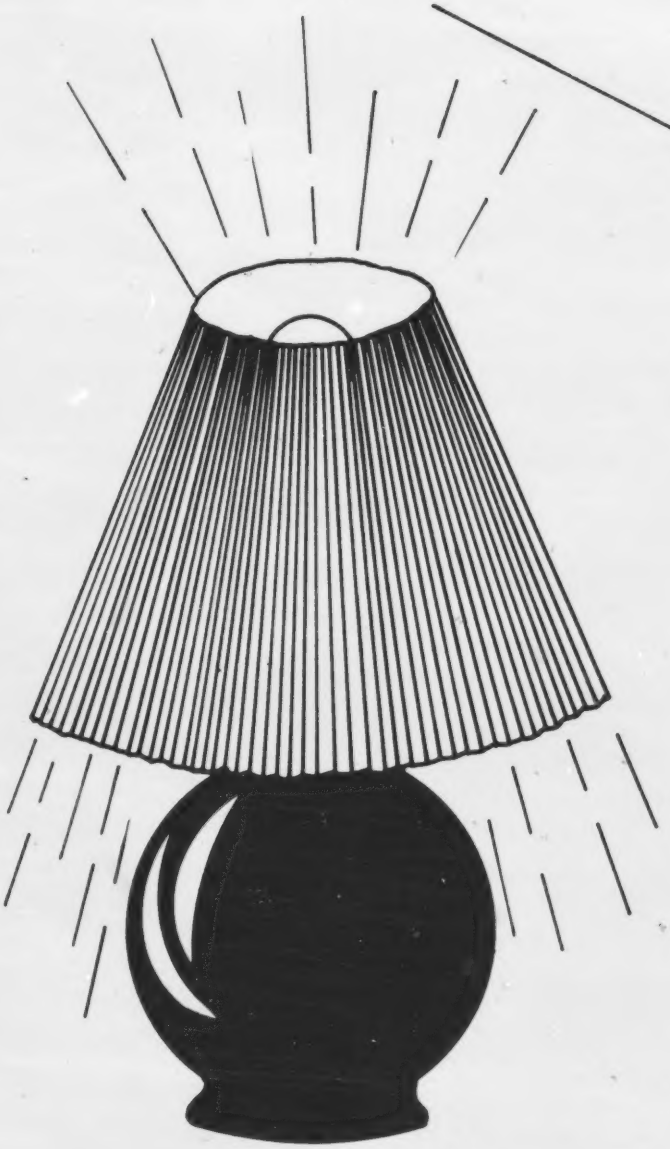
Energy

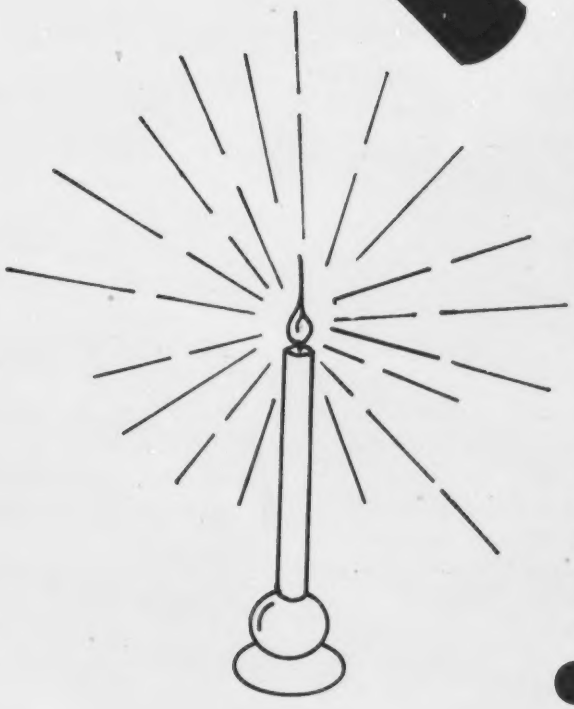
heats





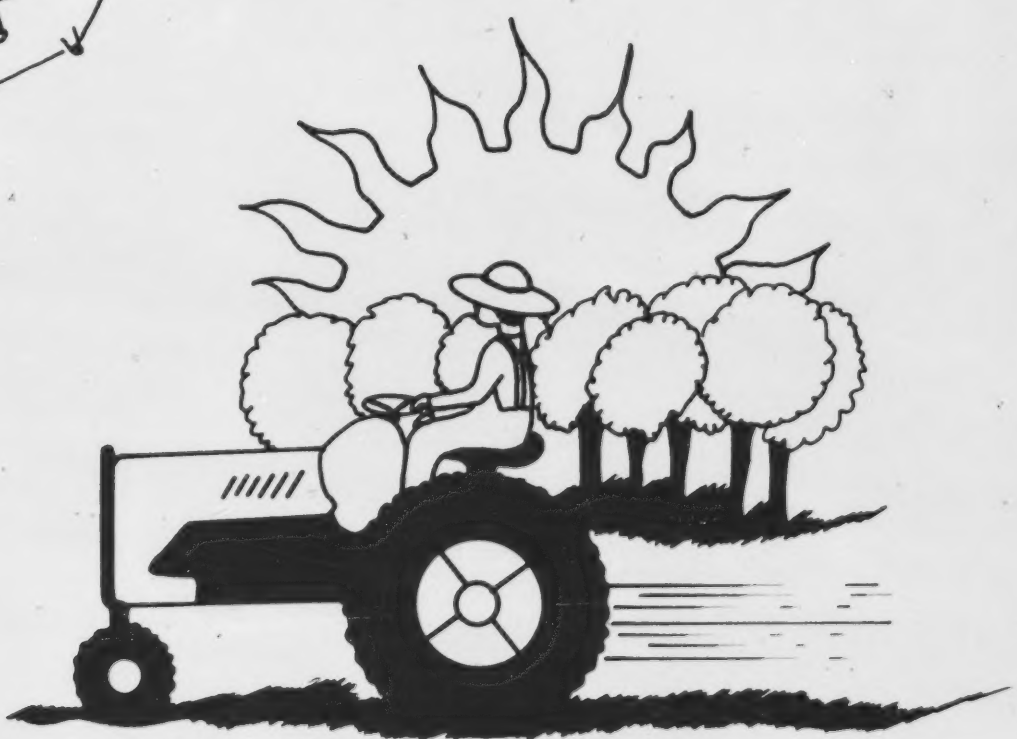
Energy LIGHTS





Energy

makes things MOVE

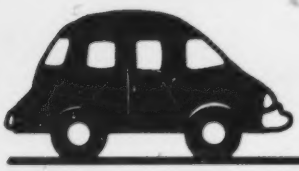


Energy Activities
Primary K-2
Sheet #5

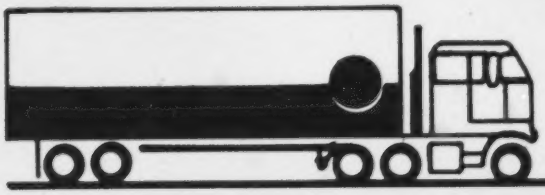
TRAFFIC SURVEY

Name _____

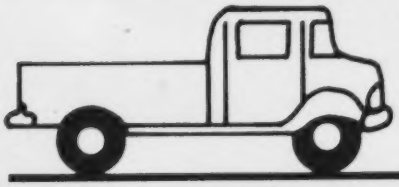
Time of Day _____ **How Many?**



Cars

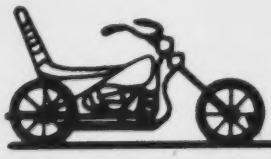


Trucks

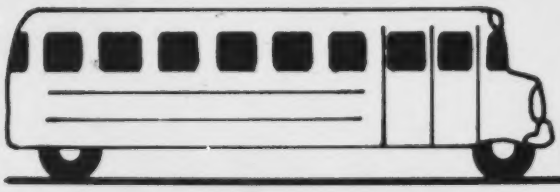


Pickups

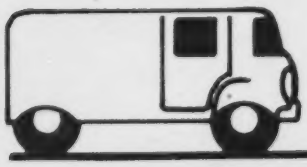
Bicycles



Motorcycles



Buses



Vans

TRAFFIC SURVEY CHART

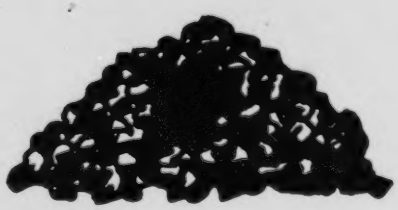
TRAFFIC SURVEY COUNT

20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0

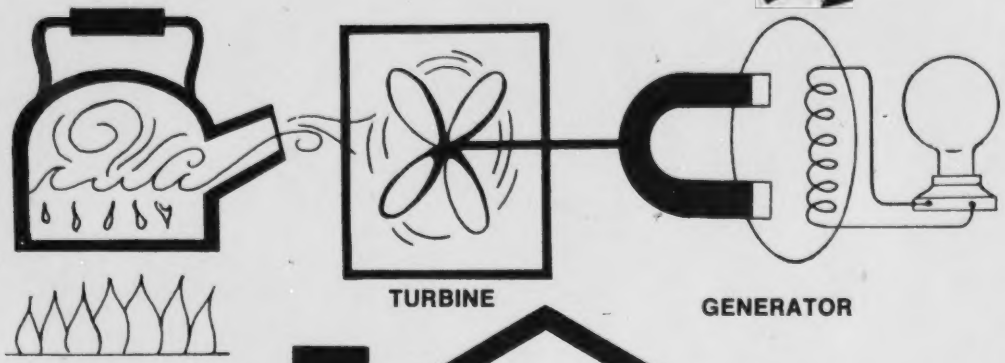
Cars Trucks Buses Cycles Bikes Pickups Vans

Energy Activities
Primary K-2
Transparency #3

How Electricity is Produced



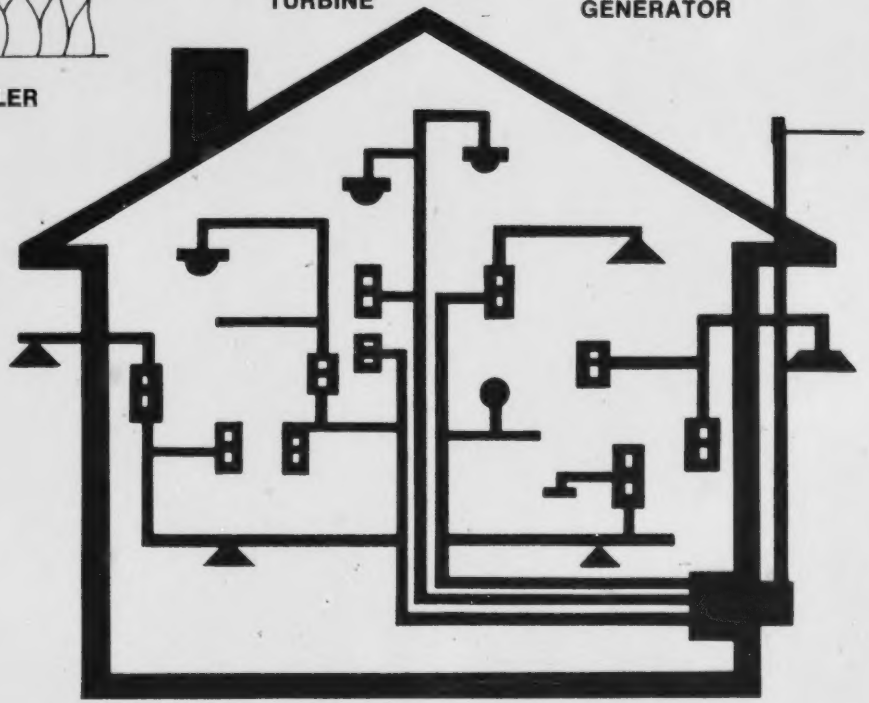
COAL



BOILER

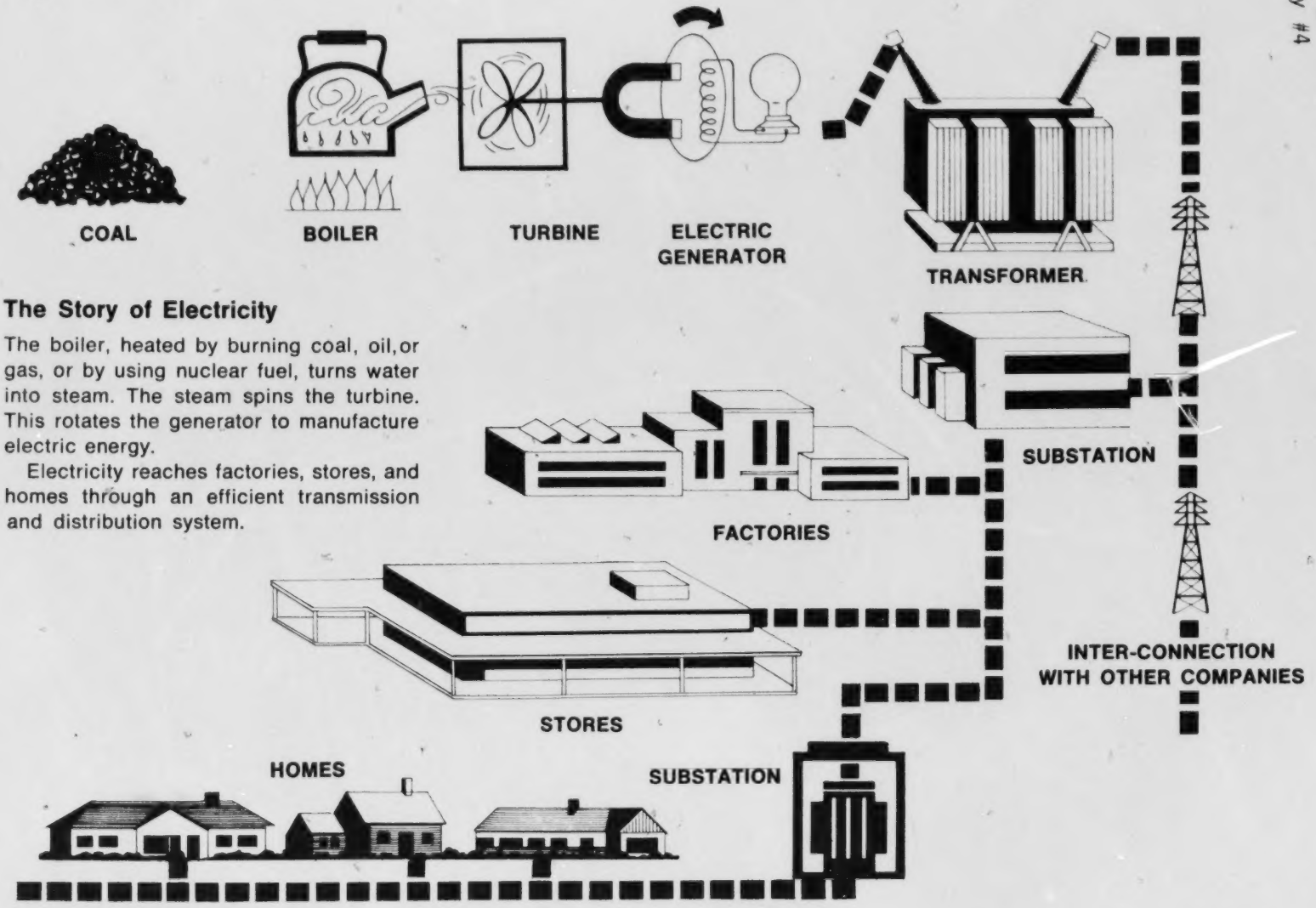
TURBINE

GENERATOR



In your house, electricity comes into the main switch box, past the meter. Wires run around inside all the walls to all the plugs and switches. It's something like a tree.

The Story of Electricity



The Story of Electricity

The boiler, heated by burning coal, oil, or gas, or by using nuclear fuel, turns water into steam. The steam spins the turbine. This rotates the generator to manufacture electric energy.

Electricity reaches factories, stores, and homes through an efficient transmission and distribution system.

SAVE ENERGY GAME

Player Pieces

Cut out and put on cardboard

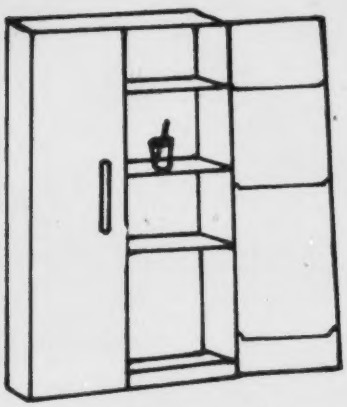
Four player pieces are included, however, more can play if you wish to devise pieces.

Use a die for determining number of spaces to be moved.

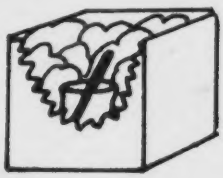
HOW DOES INSULATION WORK?

1. Fill a glass with water.

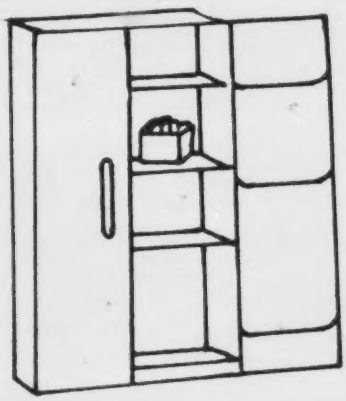
   Use a thermometer to check that the water is at 70° F.



2. Put the thermometer in the glass, put the glass in the refrigerator and check the temperature every 5 minutes.



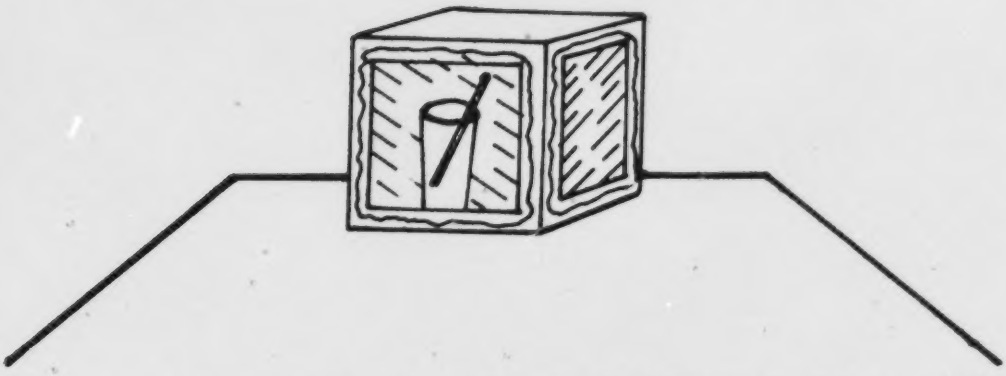
3. Refill the glass with water. Find a cardboard box and put cotton in the bottom. Put the glass on the cotton. Pack the empty spaces with cotton.



4. Put the box in the refrigerator and check the temperature every 5 minutes.

The cotton slows down the loss of heat. If you do not have enough insulation you burn more fuel to stay warm.

HOW DO STORM WINDOWS WORK?



1. Use a cardboard box and cut four large "windows." Put one window on each side of the box. Tape a piece of plastic over each opening (tape it on the inside).

2. Fill a glass with water, put in a thermometer, and put it in the box.

3. Put the box in the refrigerator and check the temperature every 3-5 minutes.

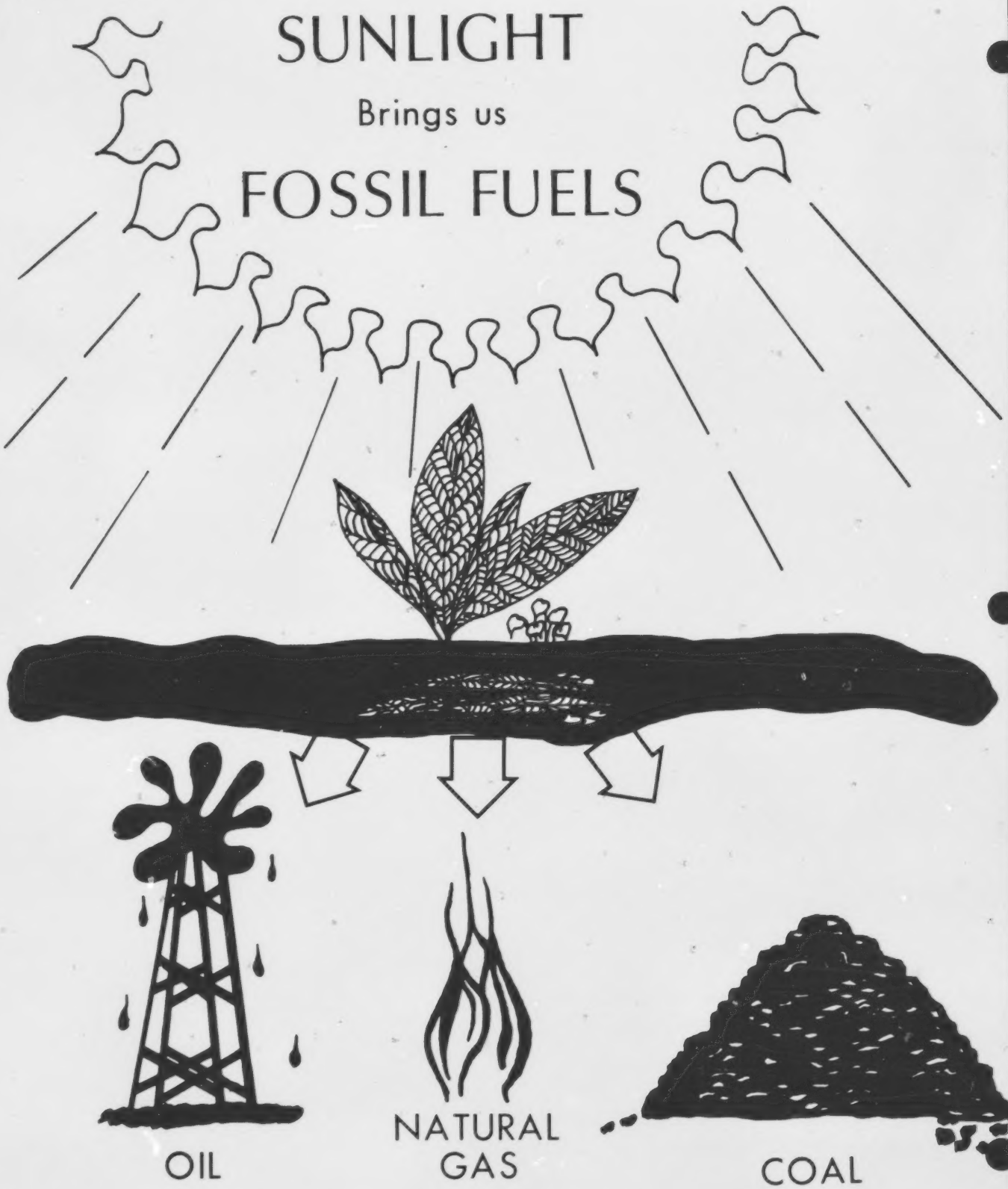
4. Add "storm windows." This time place the plastic over the outside of the openings. Pull the plastic tightly.

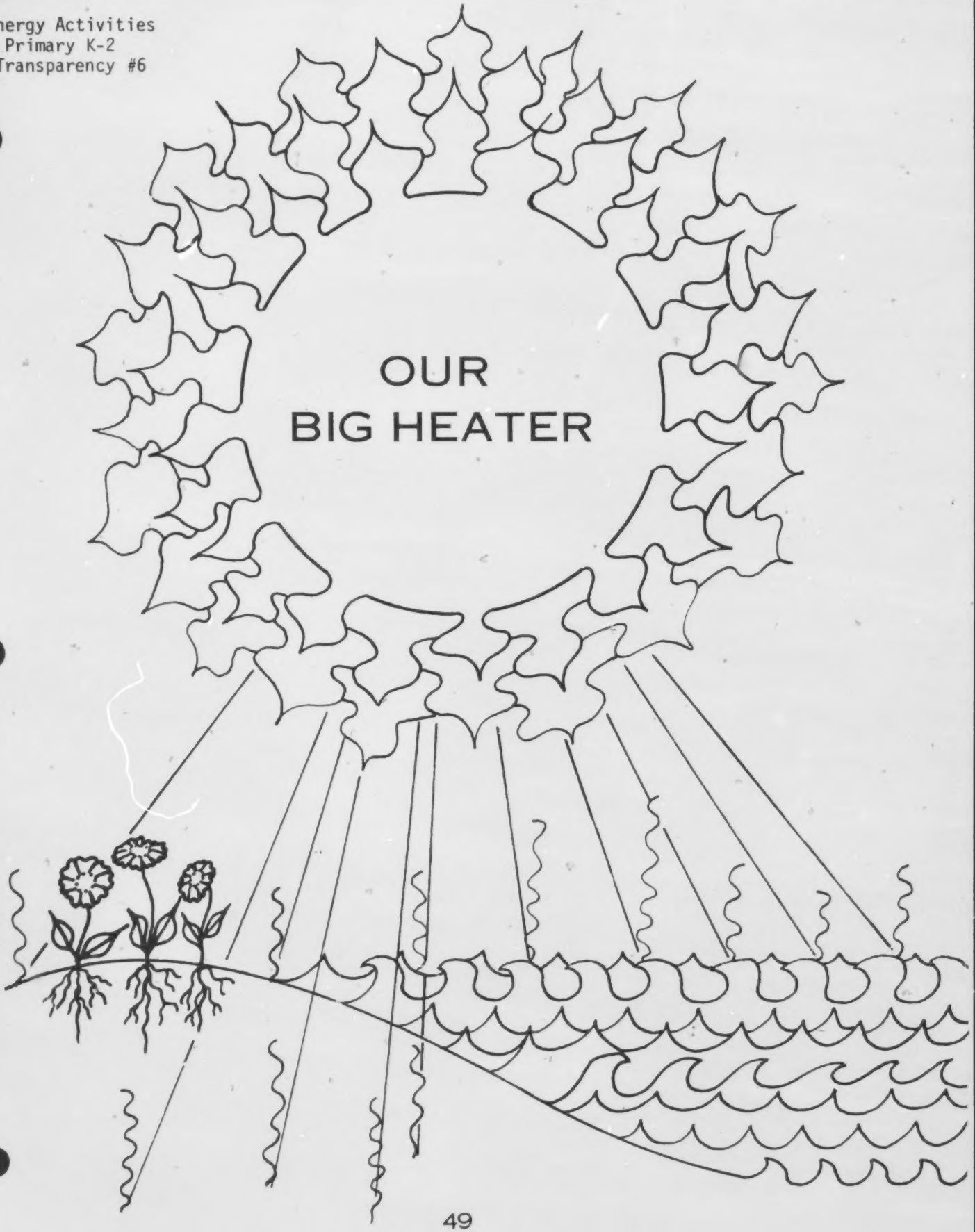
5. Put it in the refrigerator again and check the temperature.

SUNLIGHT

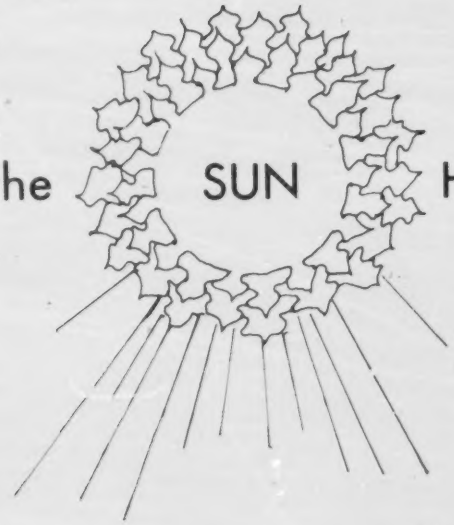
Brings us

FOSSIL FUELS



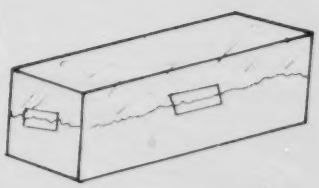

OUR
BIG HEATER

Let the SUN Help Heat Your House

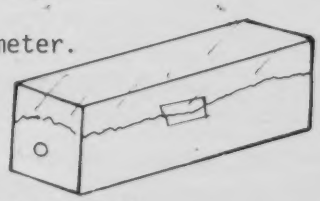


Energy from the sun is free! How can you use it?

Use a shoebox and tape a piece of plastic over the top.

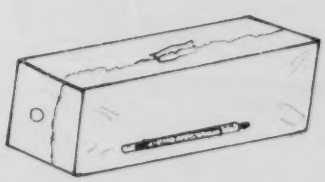


Punch a small hole in one end of the box and put in a thermometer.

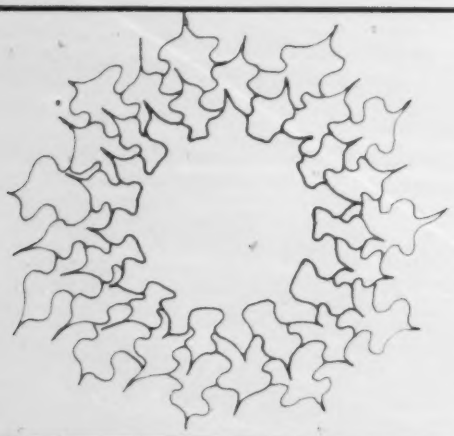


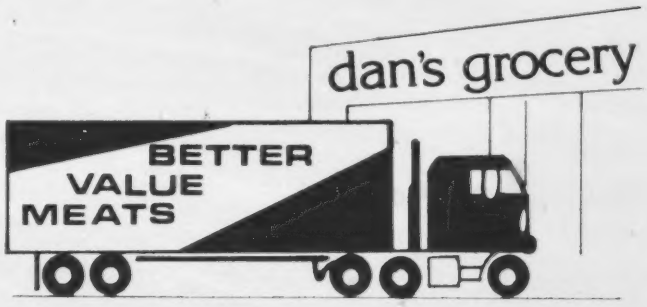
On a sunny day put the box on the sunniest window sill with the plastic facing the sun.

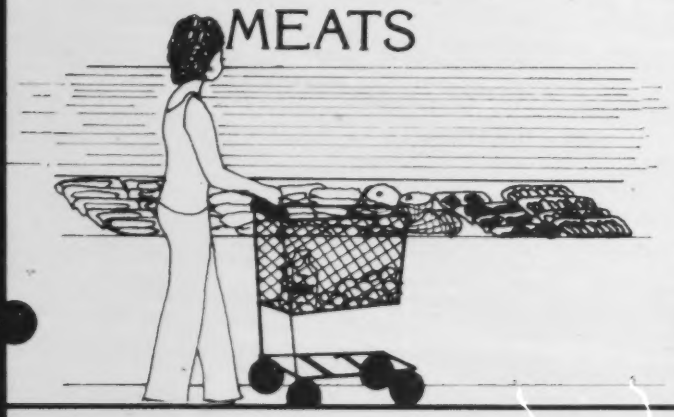
Watch the thermometer to check the temperature.

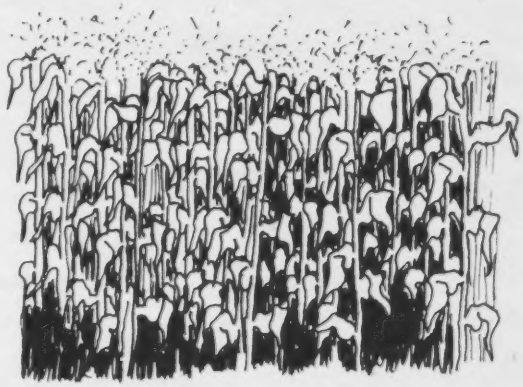


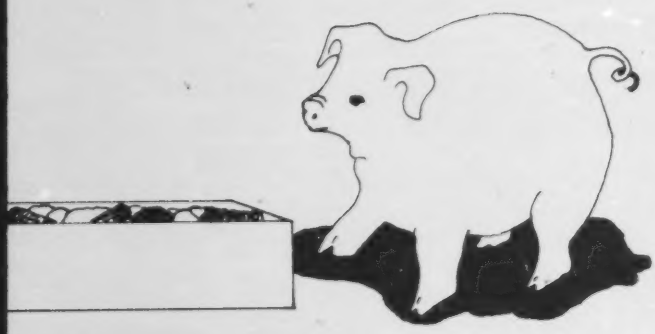
Put a piece of cloth over the plastic and check to see if the temperature rises slowly or quickly.

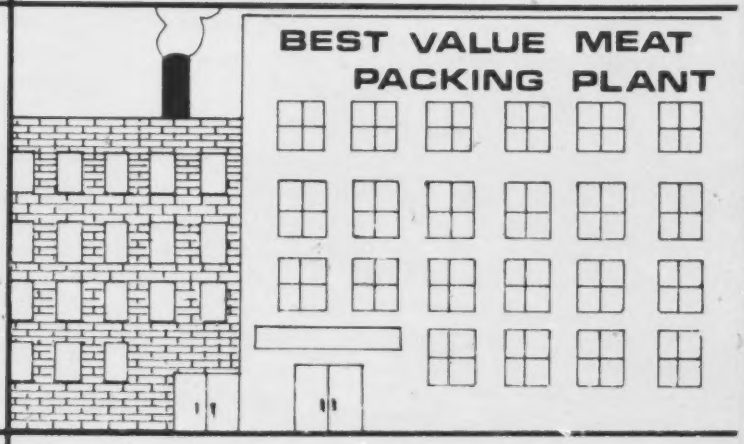


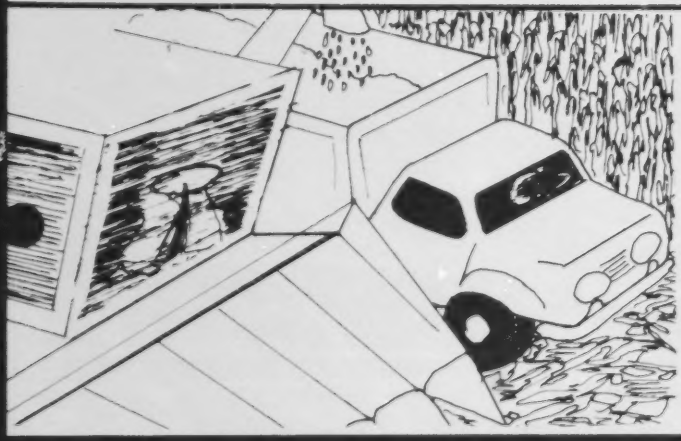

dan's grocery
BETTER
VALUE
MEATS


MEATS





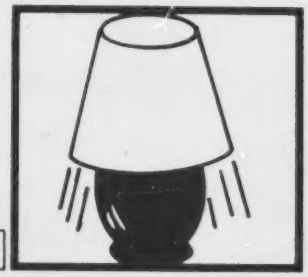

BEST VALUE MEAT
PACKING PLANT

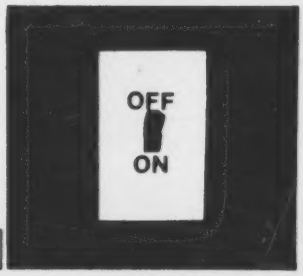


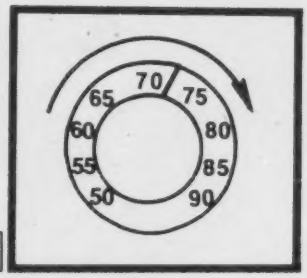
Energy Activities
Primary K-2
Sheet #7

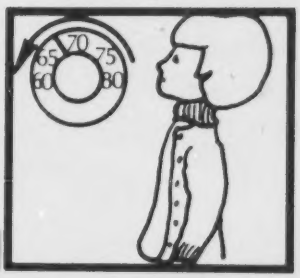
CONSERVATION CHECKLIST

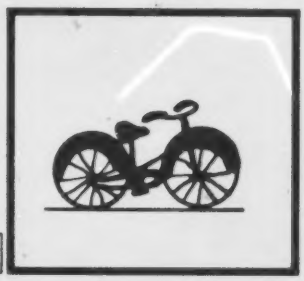
Put a check in the box by the pictures that show how you can conserve energy.

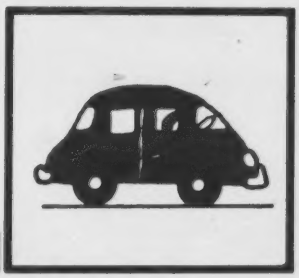


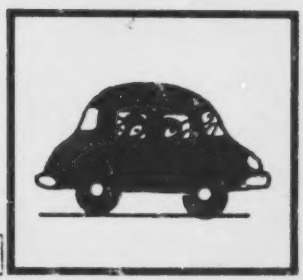


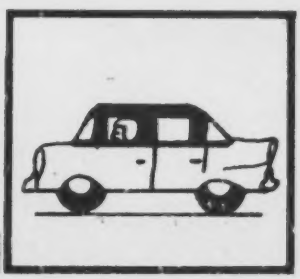


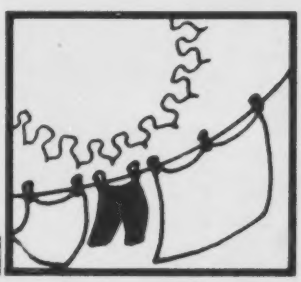


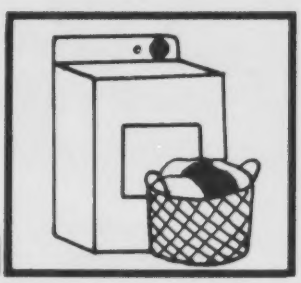












Dear Parents,

Your children have begun learning about energy, especially energy found in the home and school. The children are also learning that we can conserve energy in many ways.

Please use the following questions to begin a family discussion of energy. Your children will thus have an opportunity to recognize the connection between what they learn at school and how they live. You need not limit your discussion to these questions but they should provide an interesting beginning!

Do take the time to talk with your children as we will be spending more time with energy education and they will be better able to relate to our studies.

Thank you.

1. Which of our appliances could we do without?
2. What form of energy runs our appliances?
3. What could we do so we wouldn't use our appliances so much?
4. Have we checked the amount of insulation in our home?
5. Where could we weatherstrip to save energy?
6. Do we use our car too much?
7. What are some activities we could do as a family that would not require extra outside energy?

ANNOTATED CHILDREN'S BIBLIOGRAPHY
Primary K-2

BOOKS AND PAMPHLETS

Department of Environmental Quality
Let's Learn About Air Pollution
Department of Environmental Quality: Des Moines, Iowa

Delightful, coloring book format for teaching young children about air pollution and what can be done.

Federal Energy Administration
Energy Activities with Energy Ant
GPO, May, 1975, 28pp.

A booklet containing pages to color, along with printed material telling children about energy. In addition, it provides various activities the child can do to review what he understands about energy and how to use it wisely.

Federal Energy Administration
My Energy Book by Energy Ant
GPO, 1976, 29pp.

Colorful and easily read material which gives a comprehensive look at what energy is, sources of energy, uses of energy, and conservation.

Gutnik, Martin J.
Energy--Its Past, Its Present, Its Future
Children's Press: Chicago, 1975

An attractive book for young children giving a brief look at energy sources and the future of our energy resources.

Iowa Power
Penwick
Iowa Power

Intriguing and simple coloring book format to aid young children in understanding what the purpose of insulation is. Includes figures for constructing a mobile.

Moore, Jordan
Energy
Grosset & Dunlap: New York, 1967, 61pp.

Provides examples of many sources of energy and also contains experiments for better understanding of what energy is.

National Wildlife Federation
The Best Present of All
National Wildlife Federation: Washington, D.C.

Comic brochure on energy for children. This is a reprint from the Ranger Rick magazine.

Podendorf, Illa
Things Are Made to Move
Children's Press: Chicago, 1970, $4.50

Book concerns itself with the basics of force and energy.

Podendorf, Illa
The True Book of Energy
Children's Press: Chicago, 1971

Book relates the importance and kinds of energy to children's own experiences. The book contains short sections and many illustrations.

Ruchlis, Hyman
Thank You, Mr. Sun
Harvey House, Publishers: New York, 1966, 45pp.

Provides many illustrations of how the sun helps mankind and nature.

Smaridge, Norah
Only Silly People Waste
Abingdon: Nashville, Tennessee, 1976, 28pp., $4.25

Fourteen silly poems that introduce young children to the importance of conserving energy and materials.

Smith, Norman F.
Sun Power
Coward, McCann & Geoghegan, Inc.: New York, 1976, 46pp., $4.64

Everything that lives and grows on the earth uses energy from the sun. Gives a new understanding and appreciation of the sun, our chief energy source.

ANNOTATED TEACHER'S BIBLIOGRAPHY

BOOKS AND PAMPHLETS

Asimov, Isaac
Electricity and Man
U.S. Atomic Energy Commission
U.S. Government Printing Office, 1974

An informative booklet intended to aid citizens in understanding the vital force of nuclear energy. This and other information booklets, are available for the general public. School and public libraries may obtain a complete set without charge. Available from: USAEC - Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830.

Asimov, Isaac
Worlds Within Worlds: The Story of Nuclear Energy, Vol. 1, 2, 3
U.S. Energy Research and Development Administration

Three comprehensive booklets including atoms, electricity, and energy showing how man has learned to produce and control nuclear energy.

Cottrell, Frederick W.
Energy and Society: The Relation Between Energy, Social Change, and Economic Development
McGraw, 1955, 330pp., $15.00

Survey which examines the use of energy in low and high energy societies.

Daniels, Farington
Direct Use of the Sun's Energy
Ballantine Books: New York, 1974, 271pp., $1.95

Provides a review of the potential of solar energy and urges additional research. Fun and informative books which could also spark projects and solar experiments.

Energy Research and Development Administration
Creating Energy Choices for the Future
Office of Public Affairs: Washington, D.C. 20545, 1975

A booklet designed to improve the understanding of the U.S. energy policy.

Federal Energy Administration
Organizing School Energy Contests
Washington, D.C. 20461

Helpful brochure encouraging the formation of school energy contests. Guidelines are given as to the processes involved.

Federal Energy Administration
Tips for Energy Savers
Washington, D.C. 20461

Helpful booklet filled with many useful and simple ways to save energy. Designed for individuals and families, but also contains a teaching guide for teachers to help students bring these tips to the concern of the family.

(Ford Foundation Energy Policy Project)
A Time to Choose: America's Energy Future
Ballinger: Massachusetts, 1974, 511pp., $12.95

Final report of a three-year, $4 million study. Reflects the conviction that America can and should have a national energy policy that serves the needs of all people.

Fowler, John W.
Energy - Environment Source Book
National Science Teachers Association, 1975

Designed for teachers who wish to incorporate a study of energy into their teaching. It is divided into two volumes, each with many charts, tables, figures.

Fritsch, Albert J. and others
Energy and Food: Energy Used in Production, Processing, Delivery, and Marketing of Selected Food Items
Center for Science in the Public Interest, 1975, 80pp.

The authors suggest ways to reduce the input of energy in food processing.

Hammond, Allen L., William D. Metz and Thomas H. Maugh II
Energy and the Future
American Association for the Advancement of Science: Washington, D.C., 1973, 184pp., $3.95

Gives an introduction to each of the present and possible future energy sources. It also covers energy conservation and energy policy.

Halacy, D.S., Jr.
Wind, Sun, and Water: Our Energy Alternatives
Harper, 1977, 192pp., $9.95

Easily read. The renewable resources of geothermal, water, tidal, sea thermal energy, wind, biofuels, and solar energy are presented for consideration.

Hayes, Dennis
Energy: The Case for Conservation
Worldwatch Paper, 1976, 77pp.

Review of the economics of energy expenditures and contains many good charts and graphs.

Hodges, Laurent and John Neff
Solar Energy: 1976
Report from the Iowa Energy Policy Council, June, 1976

Descriptive report of some uses to which solar energy is being put and anticipation for further uses.

Iowa State Department of Public Instruction
Energy Conservation in School Facilities

Brochure designed to encourage energy conservation in school facilities. Specific recommendations for reducing energy waste are proposed.

Lapp, Ralph E.
The Nuclear Controversy
Fact Systems: Connecticut, 1974, 93pp.

Especially interesting to foes of nuclear fission.

Lemish, Dr. John
Mineral Deposits of Iowa
Iowa Southern Utilities Company
Craftsman Press, Inc.: Burlington, April, 1969

Excellent resource for Iowa teachers as it is a statement of the mineral deposits and their potentials in the state of Iowa. Some of the information can be condensed and revised for use with upper elementary students.

Miller, Roger LeRoy
The Economics of Energy: What Went Wrong?
Morrow, 1974, 131pp., $4.95

Short review which includes criticism of living the simple life and price controls.

Olin, Dr. Hubert L.
Coal Mining in Iowa
State Mining Board
State of Iowa: Des Moines, Iowa, 1965

Booklet which presents the early history of coal mining in Iowa, its importance as a resource of the state, and its role in the development of Iowa's economy.

Rocks, Lawrence and Richard P. Runyon
The Energy Crisis
Crown: New York, 1972, 189pp., $2.95

Review of sources of energy, impending crisis, resolutions for the problems the U.S. is presently facing.

Simmons, Henry
The Economics of America's Energy Future
U.S. Energy Research and Development Administration, Office of Public Affairs: Washington, D.C. 20545, 1975

Booklet which reviews the role of energy in American life, trends in energy supply, and highlights various forms of energy.

Steinhart, Carol and John Steinhart
The Fires of Culture: Energy Yesterday and Tomorrow
Duxbury, 1974, 273pp., $4.95

A general introduction to energy. Contains material on energy policy, energy and food.

Stolp, Richard N. and Frederick P. Deluca
Perspectives on Iowa Coal
Energy and Mineral Resources Research Institute, Iowa State University: Ames, Iowa 50011, 1976

Colorful and easily understood report on the Iowa Coal Research Project which provides information for interested Iowans.

Swatek, Paul
The User's Guide to the Protection of the Environment
Friends of the Earth, 1970, 305pp.

Paperback which provides specific information on daily decisions which could improve or deteriorate a person's environment. Packaging products, cleansers, energy consumption in the home, are examples of topics the book covers.

Tuthill, Dr. Samuel and Maurice Van Nostrand
Our Energy Needs: Questions and Answers
1973

Very helpful material regarding an energy shortage in the U.S., related in concise form. Helpful to Iowa teachers at all levels.

Udall, Steward and others
The Energy Balloon
McGraw, 1974, 288pp., $7.95

Author urges development of new attitudes and leaner life-styles in order that there will not be as much wastefulness.

U.S. Department of Commerce
Energy: Critical Choices Ahead
Office of Energy Programs, May, 1975

Brochure designed to put the energy problem into perspective and to give indications of the efforts required to meet energy needs.

U.S. Environmental Protection Agency
Questions and Answers About Nuclear Power Plants
U.S. Environmental Protection Agency: Washington, D.C., Revised, 1973

Pamphlet designed to answer many questions which have arisen concerning nuclear power plants and the environment.

ANNOTATED TEACHER'S BIBLIOGRAPHY

CURRICULUM GUIDES AND RESOURCE BOOKS

American Gas Association, Education Services, 1515 Wilson Boulevard, Arlington, Virginia 22209

Provides many booklets, pamphlets, kits, filmstrip on natural gas. Specifically for grade 5 you may be interested in "Natural Gas Serves Our Community Kit"--N00160 and "Flames and Energy"--N81070.

A Teacher's Introduction to Energy and Energy Conservation
Ohio Department of Education, 1975
Battelle Center for Improved Education, 505 King Avenue, Columbus, Ohio 43201 (ED 127 160)

Guidelines on energy and energy conservation. Provides teacher orientation to energy education and general suggestions for teaching units.

CEL Blocks
Primary Interdisciplinary Environmental Learning Packets,
Brevard County, Florida (ESEA Title III, Project #050-2323-73003)

Student cards covering areas of environmental education which can be used by teachers in a variety of interdisciplinary ways.

Energy
Environmental Education Project, ESEA Title III, Section 306
Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, Kansas 66612 (ED 093 649)

Objectives are listed, along with activities which meet the stated objectives. Teachers select only those appropriate to the objectives for their students.

Energy
Michigan United Conservation Clubs, P.O. Box 30235, Lansing, Michigan 48909

Provides information on the nature of energy, sources and uses of energy, and conservation. There are also some work sheets and ideas for helping others learn more about energy.

Energy
Social Issues Resource Series, Eleanor C. Goldstein, c. 1975.
Social Issues Resource Series, Inc., 1200 Quince Orchard Boulevard, Gaithersburg, Maryland 20760

Notebook filled with reprints of articles related to energy.

The Energy Challenge
Federal Energy Administration
The Energy Challenge, Box 14306, Dayton, Ohio 45414

Twenty-five spirit duplicating activity masters designed for grades 5 through 8. Also contains a teacher's guide section.

Energy Conservation Classroom Kits 1-3, 4-6
Southern California Edison Company, c. 1976
Educational Services, Room 397, P.O. Box 800, Rosemead, California 91770

Colorful kits to help teachers teach about energy conservation. There are folders, inspector cards, stickers, certificates. The teacher's guide contains ideas and lesson plans, in addition to duplicating masters.

The Energy Crisis: What You Can Do About It
Standard Oil Company (Indiana), c. 1973
Mail Code 3705, 200 E. Randolph Drive, Chicago, Illinois 60601

Folder containing four spirit masters and specific teaching instructions. The spirit masters give information and ask for students to supply some interpretation. Parents and other adults are encouraged to participate.

Energy Crisis Teaching Resources
Curry, Wendell, et. al., Oregon State Board of Education, Salem, Oregon, 1973, 59 pp. (ED 085 316)

Many very useful activities to be used in stressing individual responsibility towards energy crisis problems.

Energy - Environment Materials Guide
Kathryn E. Mervine and Rebecca E. Cawley
National Science Teachers Association, Washington, D.C., 1975
(ED 111 663)

Handy source book containing annotated bibliographies for teachers, students, non-print material.

Energy - Environment Mini-Unit Guide
Smith, Stephen M., Editor, c. 1975
National Science Teachers Association, Washington, D.C. (ED 111 664)

Materials designed to stimulate decision making in young children and to make teaching more interdisciplinary. It is filled with many activities and guidelines.

Energy for Today and Tomorrow
San Diego City/County Schools Energy Education Committee
Department of Education, San Diego County, 6401 Linda Vista
Road, San Diego, California 92111, 1975

Activities for students in grades kindergarten through six.
These help to create an awareness of the need of dealing with
energy problems.

Energy and Man's Environment
Jones, John, D.Ed., Editor, 1976
Energy and Man's Environment, Inc., 0224 S.W. Hamilton, Suite 301,
Portland, Oregon 97201

Interdisciplinary teacher's guides to energy and environmental
activities. Involves 8 books - Activity Guide, Uses of Energy,
Sources of Energy, Impacts of Energy, Limits of Energy, Conversion
of Energy, Future Sources of Energy, Glossary.

Energy and Man's Environment - Activity Guide
Ris, Thomas F.
Energy and Man's Environment, 2121 Fifth Avenue, Seattle,
Washington 98121 (ED 106 070)

Provides educational strategies and materials needed for introducing
energy to all grade levels on an interdisciplinary basis. Each chapter
has four themes: (1) Scientific, (2) Ethical, (3) Aesthetic,
(4) Utilitarian.

Energy Activities for the Classroom - 1976
Coon, Herbert L. and Michele Y. Alexander, 1976
ERIC Center for Science, Mathematics, and Environmental Education
College of Education, The Ohio State University, 1200 Chambers Road,
Third Floor, Columbus, Ohio 43212

Resource booklet of energy teaching activities divided into grade
levels: K-3, 4-6, 7-9, 10-12.

Environmental Education: Strategies for Wise Use of Energy
Division of Science Education, North Carolina Department of Public
Instruction, Raleigh, North Carolina 27611, c. 1974

Designed for use at all grade levels, therefore, activities are
grouped K-3, 4-6, 7-12. An appendix contains charts, glossary,
bibliography, checklists.

Fun With the Environment
Environmental Protection Agency
Washington, D.C., 1973, 20pp. (ED 103 213)

Activity booklet which helps young children learn about their environment. The booklet has a cartoon and coloring book format.

Heirarchy Chart
John Muir Institute for Environmental Studies, Inc., 2118-C Vine Street, Berkeley, California 94709

Comprehensive total concept chart which was to be used in developing environmental studies curricula to supplement existing K-12 programs.

Living Within Our Means: Energy and Scarcity
Environmental Educational Instructional Activities K-6
The University of the State of New York, The State Education Department, Albany, New York 12234

Instructional manual which illustrates ways in which environmental concerns may be integrated into the curriculum. Excellent activities arranged according to disciplines.

"Mickey Mouse and Goofy Explore Energy"
Walt Disney Productions, 1976
Public Affairs Department, EXXON, U.S.A.
P.O. Box 2180, Houston, Texas 77001

Very comprehensive, yet delightfully presented energy comic book. Copies are available from the above address. Covers previous sources of energy and possible future sources.

My Energy is Your Energy
Arizona Department of Education, February, 1974

Resource book and conservation activities designed for K-12.

Nuclear Power - Meeting a Need a New Way
Cedar Rapids Community Schools, 346 2nd Avenue, S.W., Cedar Rapids, Iowa 52404, c. 1972

Provides good suggestions as to teaching about nuclear power.

Student Learning Activity Module "The Energy Crisis"
Hughes, Judi and Lee County Environmental Education Program
Title III ESEA, 2266 Second Street, Fort Myers, Florida

Contains lesson plans, resource materials, and a Student Teaching Module on energy. Developed to help create an awareness of the causes, and some solutions for the energy crisis the world is facing.

Teacher's Handbook of Energy
Colorado Department of Education, Denver, Colorado 80023, c. 1974
(ED 119 957)

Provides teachers with information on energy and instructional activity suggestions.

Ways to Environmental Education, Volume III
Allen, Rodney F., Ed. and Others
Florida State University, Tallahassee College of Education, Tallahassee Junior Museum, Florida, 1975, 150pp.

Ten environmental booklets in one volume. One booklet covers energy learning activities for camp and home.

Wide World of Energy Kit
Walt Disney Productions, 1976
Walt Disney Educational Media Company, 500 South Buena Vista Street, Burbank, California 91521

Kit contains cassette and color filmstrip titled, "The Search for Power and Energy;" 18 full-color study prints; Energy Game; 30 copies of the energy comic book, "Mickey Mouse and Goofy Explore Energy;" 10 energy activity cards; teacher's guide with information and additional activities.

ANNOTATED TEACHER'S BIBLIOGRAPHY

EDUCATIONAL JOURNAL ARTICLES

Asimov, Isaac
"The Fascinating Story of Fossil Fuel"
National Wildlife
Vol. 11, November 5, August-September, 1973

Colorful charts could be helpful material for teachers.

"Energy Consumers Turn into Conservationists"
Nation's Schools
93: 4: 26-28, April, 1974

Describes how the topic of energy conservation has been introduced into school curriculums. Salem, Oregon; Marshalltown, Iowa; Des Moines, Iowa; Buckingham, Pennsylvania are mentioned specifically.

Fowler, John M.
"Does the Energy Theme Belong in the Classroom?"
Today's Education
65: 88-9, March, 1976

Teachers are encouraged to put more emphasis on energy education in the schools. Suggestions are given to make it interdisciplinary and goals are stated which aim to prepare the "students of today - citizens of tomorrow" for life.

Fowler, John M.
"Energy, Education, and the 'Wolf' Criers"
Social Education
pp. 245-256, April, 1976

Examines the background to the current energy crisis and outlines some possible solutions to the problems.

Glickman, L. J.
"Teaching Guide on Energy"
American Education
11: 40, June, 1975

Reviews an informative handbook entitled Energy Crisis Teaching Resources: A Special Publication Suggesting School Activities Which Stress Individual Responsibility Towards Energy Crisis Problems which was initially written for Oregon's Energy Crisis Week (December, 1973).

Hankla, Alice Kimbler
"An Energy Conference for Little People"
Science and Children
Vol. 12, No. 7, pp. 5-7, April, 1975

Reviews a conference which was held for children ages 4 and 5 at which they learned what energy is, how it works, and devised methods of energy conservation.

Harder, Peter J.
"Activity Cards Bridge Science and Social Studies"
Science and Children
Vol. 12, No. 7, pp. 8-10, April, 1975

Utilizing photography, the author developed a series of local photos to be made into activity cards with the questions on the back. Several different approaches to using the cards were suggested.

Hawkins, M. E.
"Energy: Future Alternatives and Risks"
Science Teacher
41: 25-7, April, 1974

Review of a two-day Academy Forum on Energy sponsored by the National Academy of Sciences. The Forum took up six propositions regarding energy. Many ideas were brought before the assembly.

Johnson, W. A.
"Energy Cricis: Not Only Why But What Can We Do?"
NASSP Bulletin
58: 28-36, May, 1974

Author expresses that the reason the U.S. is a nation of energy spendthrifts is that we have been paying far too little for the energy we use. Feels that a rise in prices will provide the incentive for conservation.

Kenick, L. E.
"Energy Teaching Centers"
Science Teacher
43: 34-5, May, 1976

Author proposes setting up Energy Teaching Centers within a community for school children, parents and homeowners, and teachers. These centers would provide means for the local population to explore and encounter energy alternatives.

Kirman, J. M. and M. A. Nay
"Joint Planning for Integrating Social Studies and Science: Teaching About the Energy Crisis"
Social Education
39: 77-80, February, 1975

The authors express the hope that by encouraging the integration of social studies and science, schools will begin the process of providing an integrated curriculum.

Messer, Melanie B.
"Energy for Today and Tomorrow with Energy Eagle"
Science and Children
Vol. 14, No. 3, pp. 18-20, November/December, 1976

Delightful energy awareness activities produced by the San Diego County Department of Education for use with elementary students. Teachers are encouraged to adapt these to their own local situations.

Nesbitt, William A.
"The Energy Question: Problems and Alternatives"
Intercom
pp. 12-16, September, 1973

Proposes some ideas for teaching about the energy questions, charts, background information and data, and some suggested solutions with both the advantages and disadvantages.

Post, T. R.
"Energy Crisis: An Opportunity for Meaningful Arithmetical Excursions"
Arithmetic Teacher
22: 61-4, January, 1975

Suggests math activities which provide meaningful situations. Emphasis is to help students become sensitive to the implications a national crisis could bring.

Sartwell, J. G. and R. P. Abell
"Teacher's Guide to the Energy Crisis"
Today's Education
64: 90-7, January, 1975

Authors present facts about energy use, questions for students and teachers, alternative sources of energy, ideas for classroom use, and resources which are available.

Sommerkamp, P.
"Energy Crisis Gameboard"
Science Teacher
42: 39-40, June, 1975

Describes a game devised by students in Kentucky as a result of their study of energy. There are two versions - one without cards and one with cards.

"Starting Points - Energy: Plugging into the Fuel Crisis"
Learning
Vol. 2, No. 4, December, 1973

Aimed at teachers of K-8. Contains a series of activities to help students understand what energy is, as it flows through our life.

Yant, S. L.
"Facing the Energy Crisis in a Mathematics Classroom"
Arithmetic Teacher
23: 223-4, March, 1976

Teacher relates specifics of an eight-day project within a math class that created practical applications to the energy crisis.

MULTI-MEDIA MATERIALS

"The American Dream is Running Out of Fuel"
18 minutes, color, $230 or $19-rent (Gr. 5-8)
Films, Inc.
1144 Wilmette Avenue
Wilmette, Illinois 60091

"Bate's Car: Sweet as a Nut"
16 minutes, 16mm, color, $230 or $30-rent, 1975 (Gr. 5-12)
Arthur Mokin Productions
17 W. 60th Street
New York, New York 10023

Presents the inventor's energy-saving inventions, particularly his methane-driven automobile. Highly recommended by AAAS.

"Coalmining: The Story of Buried Sunlight"

Filmstrip, elementary

Ecology Activity Cards
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

Some of the activities related specifically to energy. Others in the box guide the children towards conservation and the idea of using our resources wisely.

Ecology: Understanding the Crisis
Series No. 6454, c. 1972
Encyclopaedia Britannica Educational Corporation
425 North Michigan Avenue
Chicago, Illinois 60611

Filmstrip, records, guides. General coverage of what has caused the crisis, how man relates to his environment, a look into the future.

"The Economics of the Energy Problem"
Economic Topic Series
Teaching Resource Films, 1976

Sound filmstrip. Provides a basic overview of the energy problem.

"Electricity"
Community Series: Systems in Our City

Elementary level filmstrip.

"Electricity from Heat and Sunlight"
8mm film loop, color, with teacher's guide, $23.50 (Gr. 4-12)
Doubleday Multimedia

Shows how electricity can be produced from heat and sunlight.

"Energy"
Iowa Petroleum Committee

"Energy: A First Film"
8 minutes, sound, color (Gr. K-3)
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

"Energy: Ability to Do Work"
9 minutes, color, sound (Gr. 5-8)
AIMS Instructional Media Service
P.O. Box 1010
Hollywood, California 90028

"Energy and Power - A First Look"
10 minutes, 16mm, 1962 (Primary - Intermediate)
Journal Films

Outlines, from the days of the caveman to the present, many ways in which man harnesses energy and increases his capacity to do work by utilizing the potential energy found in wood, wind, and running water.

"The Energy Challenge" - Kit, c. 1975
Pollution Control Education Center
Township of Union Public Schools
Union, New Jersey

Grade level undesignated, however, could be used in Gr. 6 with some modification and for the junior high. Contains student booklets, teacher's guide, two filmstrips with cassette, duplicating masters, activity cards, and overhead transparencies.

"Energy Crisis"
13 minutes, 16mm, color, 1972 (Gr. 4-9)
Journal Films

Reviews the different energy sources and indicates the length of time we may be able to depend on them. Shows the possibility of solutions and developments which may some day provide unlimited power to meet our needs.

"Energy Crisis Game," 1973 (Upper elementary and junior high)
Intemation, Inc.
New York, New York 10001

For 2-6 players.

"Energy Game"
Northern Natural Gas"

Twenty minute slide and sound show followed by a quiz, designed for grades 4-6. The stress is upon energy conservation with a short review of where energy comes from.

"Energy With a Capital C - for Conservation"
Energy Policy Council
707 East Locust
Des Moines, Iowa 50319

Slide presentation complete with slides, audience pamphlets, and a recorded cassette of the slide narrative.

"First Film on the Wind"
9 minutes, 16mm, color, sound, c. 1966 (Elementary)
BFA Educational Media
2211 Michigan Avenue
Santa Monica, California 90404

Shows how, though one cannot see the wind, he can see what the wind does, such as making waves on the water, swaying trees, and lifting kites. Shows how rain clouds come and go with the wind.

"Global Emergency: Energy"
Guidance Associates, c. 1975 (Gr. 6)

Two sound filmstrips, "New Sources, New Values" and "The Energy-Aware Society," which deal with the various alternative sources of energy. It also looks at the social, economic, and political problems in our world of shortages. The students also look at alternative life-styles.

"The Great Search: Man's Need for Power and Energy"
13 minutes, 16mm, color, with teacher's guide, 1972 (Gr. 4-up)
Walt Disney Production

Traces history of man's attempts to harness energy of sun, water, lightning, etc. in order to produce power needed for daily living.

"Man's Search for Energy"
Filmstrip, 36 frames, $6.75 (Gr. 5-8)
McGraw-Hill Films
1220 Avenue of the Americas
New York, New York 10020

"Our Energy-Based Economy"
EEI Pub. No. 74-54
Edison Electric Institute

A multi-media instructional program for Gr. 6-8. Contains four filmstrips, four records, duplicating activity sheets, duplicating pre/post assessment sheets, and a teacher's guide.

"Our Energy Supply"
Part of The Only World We Have Series (Gr. 6)
Narrated by Dr. Leonard Reiffel and Miss Moones, Bell and Howell

Twenty minutes, two-part tape. Presents a wide variety of the problems relating to our energy usage. Covers definition of energy, present sources, explains origin of our energy problem, possible energy sources.

"The Petrified River"

Film available from Iowa Electric Light Company.

"Power"
Color filmstrip, 53 frames. Sound with cassette or record. (Intermediate - Junior High)
From Water and How We Use It Series, 1971
6 filmstrips with cassettes, $70.00; with records, $55.00
Coronet Instructional Films

Shows how water power helped the development of early industry and how water supplies power for hydroelectric energy from the water and how we use it.

"Power and Energy"
Set of two filmstrips, record or cassette, automatic and manual, $25.00 per set
18-20 minutes, color, 50-59 frames, with teacher's guide (Gr. 5-9)
Educational Activities

Answers such questions as: Where does energy come from? How is it produced and distributed? Why are there "Brown-outs?" How do you produce power from fossil fuels, fission, fuel cells, ocean, solar energy?

"A Practical Guide to the Energy Crisis," 1975
Schloat Productions Distribution Center
West Nyack, New York 10994

Two excellent color filmstrips, two records or cassettes. Part One: "Reasons for the Crisis," 89 frames, 10 minutes. Part Two: "Responding to the Crisis," 78 frames, 11 minutes. (Gr. 6-8)

"Science and Society: An Inquiry Into Technology and Values: Energy," 1975
Schloat Productions Distribution Center
West Nyack, New York 10994

Excellent sound filmstrip program containing two filmstrips with cassettes. Filmstrip I - "Power Struggle," 101 ft., 19 minutes. Filmstrip II - "Future Power," 103 ft., 19 minutes. (Gr. 6-8)

"This Earth: Everything Fits Together," 1973
Guidance Associates

Multi-media learning experience for the elementary years. Children see that everything is interdependent and that the sun is the energy source for all life on earth. Sound filmstrips, study cards, poster, game poster, stencils, work sheets, and teacher's guide.

"The World of Energy"
Filmstrip (Gr. 5-8)
National Geographic Society
Department 1037
Washington, D.C. 20036

TEACHER'S RESOURCE LIST

In addition to those listed below, specific suggestions are also included within the packets with the activities.

1. AEA - Area Education Agency

   Check their film and book catalogs and any other material they have available.

2. Chamber of Commerce

   Contact for help in locating local solar buildings and homes, industries which may be cooperative, etc.

3. C.U.R.E. (Citizens United for Responsible Energy)
   1342 30th Street
   Des Moines, Iowa 50311 (515/277-0253)

   Contact for information and speakers.

4. Iowa Energy Policy Council
   707 East Locust
   Des Moines, Iowa 50309 (515/281-4420)

   Contact for information and speakers.

5. School custodian.

6. Utility and Power Companies.

WILL YOU HELP US?

Use the following space for suggestions, criticisms, or comments. We welcome any contribution you may wish to make. Please send these to Duane Toomsen, Environmental Education Consultant, Curriculum Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Name _____

Address _____

City _____ State _____ Zip _____

School _____ Grad _____

How did you use the Packet?

Was it relatively easy to integrate the activities into existing studies?

What were your feelings about the values activities?

How could the packets be improved?